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ROYAL BOTANIC GARDENS, KEW

I—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA : XXV*.

SPECIES NOVAE MEXICANAE HINTONIANAE.

The rich collections formed by Mr. G. B. Hinton in Mexico now exceed 8,000 numbers, mostly from the district of Temascaltepec, in the south-west part of Mexico State. Six of the novelties have already been figured in Hooker's Icones Plantarum, namely *Nissolia Hintoni* (t. 3248), *Platymiscium lasiocarpum* (t. 3249), *Cuphea Hintoni* (t. 3294), *Hintonia latiflora* var. *leiantha* (t. 3295), *Bouvardia capitata* (t. 3296) and *B. cataphyllaris* (t. 3297). The present paper includes descriptions of thirteen new species, five of which, belonging to the Gesneriaceae, are contributed by Mr. C. V. Morton of the United States National Herbarium.

I. MISCELLANEOUS NEW SPECIES.

STERCULIACEAE (A. A. Bullock).

Byttneria atrata *Bullock*, sp. nov.; inter species mexicanas caulibus herbaceis, foliis longius petiolatis laminis basi profunde cordatis, floribus plus minusve terminaliter paniculatis distincta.

Herba erecta, perennis, 2–3 m. alta ; caules virides, haud lignosi, simplices vel apicem versus (regione florifera) leviter ramosi, basi 5–8 mm. vel ultra crassi, prominenter 5-angulati, angulis subdistanter aculeatis, aculeis patentibus vel leviter recurvis circiter 1–1·5 mm. longis, ceterum glabri. *Folia* inferiora longe petiolata ; petioli ascendentes, usque ad 6 cm. longi, angulati, aculeati, apice basique plus minusve pilosi ceterum glabri ; lamina patens, triangulari-ovata, apice longe acuminata, basi profunde cordata, usque ad 12 cm. longa, et 8 cm. lata, subtus parcissime supra densius hirsuta, e basi 7 (5–11-) -nervia, nervis venisque minute vel obsolete aculeatis, marginibus grosse serrata vel crenato-serrata, dentibus mucronulatis et plus minusve ciliatis : folia superiora minora, sursum in bracteas abeuntia ; petioli vix distincti usque ad 1 cm. longi ; lamina ovata usque anguste lanceolata, basi truncato-subcordata, ceterum ut in foliis inferioribus. *Inflorescentiae* terminales et laterales, paniculatae ; flores graciliter pedicellati, in cymis umbelliformibus paucifloris ex axillis foliorum superiorum vel bractearum foliacearum ortis dispositi ; pedicelli vulgo 3–4 mm. sed usque ad 8 mm.

*Continued from K.B. 1935, 316.

longi, basi bracteolati, bracteolis triangularibus usque ad 2·5 mm. longis sed saepissime minoribus. *Sepala* 5, oblongo-ovata, apice subacuta, 4·5–6 mm. longa, 2–3 mm. lata, utrinque glabra. *Petala* 5, in toto usque ad 4 mm. longa ; unguis membranaceus, basi leviter dilatatus, usque ad 1 mm. longus ; lamina erecta, carnosa, suborbicularis, usque ad 1 mm. diametro, apice plus minusve acuta usque rotundata, incurvata, utrinque margine glandula nectarifera brevissime stipitata instructa ; appendix carnosa, dorsaliter affixa, anguste lingulato-ovoidea, breviter stipitata, usque ad 2·5 mm. longa, 0·6 mm. lata. *Staminum tubus* membranaceus, cupularis, 1 mm. longus, apice 5-fidus, lobis 0·5 mm. longis rectangularibus glandula carnosa apiculato-excurrente terminatis ; antherae parvae subsessiles, sinibus loborum insertae, extrorse dehiscentes. *Ovarium* subglobosum, circiter 0·5 mm. diametro, glabrum, leviter rugosum ; stylus subulatus 0·5 mm. longus. *Capsula* globosa dense carnosa echinata, in toto 1·5 cm. diametro, echinis conico-subulatis circiter 3–5 mm. longis. *Semina* elongato-reniformia, circiter 7 mm. longa, laevia, brunnea.

Mexico. State of Mexico : District of Temascaltepec ; Timbres, 1900 m., fl. 4 Aug. 1932, *Hinton* 1242 ; Cerro Muñeca, 2300 m., " 3 m. high, flower black," fl. 18 Aug. 1932, *Hinton* 1378 ; Tule, 1800 m., " 2 m. high," fl. and fr. 21 Sept. 1933, *Hinton* 4664 ; Tejupilco, 1340 m., fl. and fr. 27 Sept. 1933, *Hinton* 4830 (type).

Byttneria atrata is a strictly herbaceous perennial, attaining nine or ten feet in height. The flowers are almost black, and are borne in pedunculate umbelliform cymes in the axils of the upper leaves or leaf-like bracts. The lower leaves are long-petiolate, and deeply cordate at the base, this character being sufficient to distinguish it from its nearest Mexican ally, *B. aculeata* (Jacq.) Jacq, which is a woody climber bearing its flowers in the axils of all the leaves on the young stems. The fruits also afford a diagnostic character in their fleshy, conical spines, as contrasted with the filiform indurated spines of *B. aculeata*.

Leguminosae (N. Y. Sandwith).

Dalea Hintoni *Sandwith* sp. nov.; ut videtur subgen. *Euparoselae*, sect. *Formosarum*, forsan *Paroselae Saffordii* Rose affinis, stipulis minutis, inflorescentiis distincte pedunculatis densissime congestifloris ac albo-lanatis, forma bractearum, petalis carinae minoribus valde distincta ; a *P. Hemsleyana* Rose (sect. *Tuberculatarum*) ramulis haud glanduloso-tuberculatis, pedunculis brevibus statim distinguitur.

Suffrutex humilis, 15–30 cm. alta, e radice subterranea crassa lignosa longe ramosa (forsan sobolifera ?) caules annotinos intricate ramosos graciles ut videtur basi saltem plus minusve procumbentes emittens ; rami hornotini multi, gracillimi, flexuosi, glabri, etuberculati, inferne rubro-purpurei ; internodia saepius 3–10 mm. longa. *Stipulae* minutae, caducae, triangulari-subulatae, circiter 0·5 mm.

longae. *Folia* glabra, rhachi foliolisque subtus conspicue glanduloso-punctatis, brevia, 0·8–1·6 cm. longa; rhachis alata; foliola 3–9-juga, crassa, subcarnosa, juniora supra plus minusve concava, supra viridia vel purpurascentia, subtus glaucescentia, spathulato-oblonga, apice rotundata, nonnunquam retusa vel crenata, costa subtus conspicua, ceterum enervia, 2–4·5 mm. longa, 0·75–1·75 mm. lata; petioluli ad 0·5 mm. longi. *Inflorescentiae* globoso-capitatae, pedunculis glabris 0·8–2 cm. longis, maturae petalis exceptis ad 1 cm. diametro, pilis mollibus sericeis albis nitentibus densissime villoso-lanatae, floribus arcte congestis; bracteae exteriores obovato-oblongae, breviter obtuse cuspidatae vel acuminatae, 3–3·2 mm. longae, 2 mm. latae, ciliatae, ceterum glabrae, extra conspicue glandulosae; bracteae interiores anguste spathulato-ellipticae, sensim acute acuminatae, circiter 4·5 mm. longae, 1–1·3 mm. latae, densissime molliter sericeo-villosae. *Calycis* tubus 2·5–2·8 mm. longus, extra dense adpresse albo-pilosus, costis absconditis, glandulis ut videtur nullis, intus glaber; dentes triangulari-lanceolato-subulatae, 1·75–2·2 mm. longae, igitur tubo breviores, basi fere 1 mm. latae, densissime piloso-ciliatae. *Flores* haud magni; vexillum ochroleucum, lamina late ovato-subreniformi, basi cordata, 2·75 mm. longa, 3·5 mm. lata, sparse glandulosa, ungue 2–2·8 mm. longo; alae violaceo-roseae, tubo staminali longe infra medium affixae, lamina 4 mm. longa, 2·1 mm. lata, ungue 1·5–1·8 mm. longo; carinae petala libera, paulo altius affixa, violaceo-rosea, lamina 4 mm. longa, 2·8–3 mm. lata, ungue 2–2·4 mm. longo. *Stamina* tubo filamentisque liberis inclusis usque ad 6 vel 6·8 mm. longa. *Ovarium* ellipsoideum, dimidio superiore pilosum, glabrum inferiore, 1·5–1·75 mm. longum, 1 mm. latum; stylus dimidio inferiore dense pilosus, superne glaber, fere 4·5 mm. longus.

Mexico. State of Mexico: District of Temascaltepec; llano, Nanchititla, 1100 m., Dec. 7th, 1933, *Hinton* 5314.

Piscidia grandifolia (*Donn. Sm.*) *I. M. Johnston* var. **glabrescens** *Sandwith*, var. nov.; a planta typica foliolis subtus haud dense lanatis sed glabrescentibus, costa nervisque principalibus pilosis, pagina mox glabrescente, adultis saepe omnino glabris differt; praeterea foliolis 17, stipite fructus 1–1·4 cm. longo calycem longe superante gaudens.

Mexico. State of Mexico: District of Temascaltepec; Chorrera, 1230 m., July 29th, 1932, *Hinton* 1193 (typus floris); *ibid.*, 1350 m., Dec. 29th, 1933, *Hinton* 5419 (typus fructus). The latter collection was noted as from a tree 6 m. high. Without locality, *Bates* in Herb. Hook.

Vernacular Name, *Cahuirrica prieta.*

This differs strikingly from Guatemalan and Mexican material of the species owing to the glabrescence of the lower surface of the leaflets, but fails to provide any other good character for specific segregation. Thus *Andrieux* 441 (Kew) has up to 15 leaflets, which are densely woolly beneath; while *Nelson* 1826 (U.S. Nat.

Herb.), with leaflets woolly beneath, agrees almost exactly with Hinton's flowering material in all details of dissection, and has almost identical fruits, except for a shorter stipe. The flowers of the Guatemalan type collection (*Heyde* and *Lux* 3709) are slightly larger.

Lonchocarpus Hintoni *Sandwith* sp. nov.; subgeneris *Euloncho-carpi* Pittier, seriei *Impressinervorum* Pittier, ut videtur juxta *L. rugosum* Bth. ponenda, inflorescentiis plerumque praecocibus, indumento dissimili, legumine latiore pilis densissimis arcte appressis pallide griseo- vel fulvo-sericeo, ovulis 1–4 differt.

Arbor parva, 6–10 m. alta, ramulis summis vetustioribus valde nodoso-cicatricosis lenticellatis teretibus, hornotinis angulatis breviter adpresse pubescentibus. *Stipulae* lanceolatae, circiter 4 mm. longae. *Folia* plane evoluta adulta 10–20 cm. longa, petiolo rhachi petiolulisque gracilibus breviter pubescentibus ; petiolus 3·5–5·8 cm. longus ; internodia rhacheos brevia, 0·6–2·2 cm. longa ; petioluli 2–4 mm. longi ; foliola 13–17, oblongo-lanceolata vel oblonga, terminalia nonnunquam oblanceolata, apice obtusa rotundata sed costa excurrente breviter apiculata, basi cuneata usque rotundata, 2–6·5 cm. longa. 0·6–2·1 (nonnunquam ad 3·2 cm.?) cm. lata, adulta coriacea marginibus conspicue revolutis, epunctata, supra dense subadpresse pubescentia, subtus dense albido-strigoso-pilosula, nervis lateralibus utroque costae latere 8–10 ascendentibus, his cum costa supra conspicue impressis subtus valde prominentibus, rete venularum subtus intricato prominente. *Inflorescentiae* vulgo praecoces, rarius cum foliis junioribus expansae ; racemi secus ramulos hornotinos breves dispositi, multi, saepe congesti, singuli 2·5–12 cm. longi, densiflori, ubique griseo- vel ochraceo-pubescentes. *Flores* in umbellis bifloris dispositi, vinacei vel caerulei ; pedunculus umbellarum crassus, brevissimus, 0·5–1 mm. longus ; pedicelli circiter 2–2·5 mm. longi ; bracteolae circiter 0·3 mm. sub flore exorientes, minutae, pubescentes, lanceolatae, 0·6–1 mm. longae. *Calyx* tenuiter griseo- et fulvo-sericeo-pubescens ; tubus circiter 2·5 mm. longus ; dentes 3 inferiores valde distinctae, triangulares, acutissimae, intermedia circiter 1·2 mm. longa basi 2 mm. lata, laterales breviores ad 0·75 mm. longae. *Vexillum* ungue vix 1·5 mm. longo ; lamina 6·5–7·5 mm. longa, 8–8·5 mm. lata, apice emarginata, basi calloso-plicata ac auriculata vel nonnunquam truncata, extra marginibus exceptis sericeo-pubescens. *Alae* ungue 2·5–3 mm. longo ; lamina 5·3–5·75 mm. longa, 2·2–2·7 mm. lata, glabra vel extra dimidio anteriore sparse pubescens. *Carinae petala* ungue 2–3 mm. longo ; lamina 5·5 mm. longa, 3–3·2 mm. lata, extra secus medium atque dimidio anteriore haud dense sericeo-pubescens, praeterea margine superiore triente posteriore ciliata. *Stamina* glabra, tubo incluso circiter 7 mm. longa ; stamen vexillare basi liberum crassum ; antherae glabrae. *Ovarium* albido-sericeum, 5·5 mm. longum ; stylus basi excepta glaber, arcuato-falcatus, 2·5–3 mm. longus ; ovula 1–4. *Legumen* oblongo-lanceolatum vel

ellipticum, tenue, arcte applanatum, marginibus aequalibus haud incrassatis nec alatis, basi in stipitem sensim attenuatum, apice attenuatum denique obtusum vel rotundatum ac apiculatum, 6·5–10 cm. longum, 2 (1·5)–2·5 cm. latum, pilis densissimis griseis vel pallide fulvis arcte sericeum ; semina ut videtur 1–2, reniformia, 6 mm. longa, vix 1 cm. lata (maturitate majora ?).

Mexico. State of Mexico : District of Temascaltepec ; near Nanchititla and Limones, on hot side of mountain, tree 10 m. with blue flowers, fl. April, fr. August 1933–1934, *Hinton* 3772, 5571, 5936 (typus floris), 6508 (typus fructus), all from the same tree ; Chorrera, 1230 m., on dry hill, tree 6 m. with blue flowers, May 1933, *Hinton* 3934 ; Los Carrisos, 570 m., shrub or tree 6 m. high on cliffs, fl. June 1932, *Hinton* 726 ; Palmar, 650 m., dry hill, tree 10 m., with blue flowers, June 1933, *Hinton* 4121.

State of Guerrero : banks of the Espiritu Santo, 600 m., tree 8–10 m. with wine-red flowers, April 1898, *Langlassé* 108 (identified as *L. guatemalensis* Bth. by Micheli, Leg. Langlass., p. 26) ; Coyuca, in barranca, tree 5–6 m. high with pink fl., April–May 1934, *Hinton* 5958 (fruit), 5977 (flower). No. 5958 has broader leaflets and smaller fruits than those of the type, the pods being only 1·5 cm. broad.

Vernacular names, *Palo de Aro* (Mexico and Guerrero, fide *Hinton* and *Langlassé*) ; *Cajurica* (Mexico, *Hinton* 3934) ; *Aricuahue* and *Zopilacuague* (Mexico, *Hinton* 726).

The Langlassé collection was confused by Micheli with *L. guatemalensis* Benth., which is totally distinct in numerous characters of the leaves, flowers and fruit. The affinity of this species is clearly rather with *L. rugosus* Bth., and *L. affinis* Pittier ; apparently also with *L. purpureus* Pittier, of which the fruit is unknown. *L. affinis*, of which no flowering material has been seen, appears to differ specifically, on present evidence, in the indumentum and the distinct wing of the vexillar margin of the pod. The name " Palo de Aro (or Oro) " is also applied in Guerrero to the very distinct *L. eriocarinalis* Micheli.

Cassia (Subgen. vel Sect. *Fistula*) **Hintoni** *Sandwith* sp. nov.; *C. grandi* L.f. affinis, pedicellis longioribus, petalis antherisque perfectis multo majoribus, praesertim fructu valde distincto angusto dense velutino-tomentoso differt.

Frutex 2–2·5 m. altus ; ramuli summi siccitate nigro-purpurascentes, satis dense pilosulo-pubescentes. *Stipulae* delapsae. *Folia* gracilia, 15–22 cm. longa, petiolo rhachique satis dense pilosulis ; petiolus 2·4–2·8 cm. longus, 1·2 mm. tantum diametro ; internodia rhacheos 1–1·4 cm. longa ; petioluli pilosuli, 1·5–2 mm. longi ; foliola in exemplis visis 17–18-juga, oblonga, apice obtusa vel rotundata minute apiculata, basi rotundata inaequilatera, 2–3·5 cm. longa, 0·8–1·3 cm. lata, chartacea, utrinque regulariter pilis mollibus subadpressis satis densis pubescentia, costa subtus pilosula, subtus quam supra pallidiora, nervatione haud conspicue

elevata, nervis lateralibus utroque costae latere circiter 6–8 ; glandulae nullae. *Racemi* numerosi, 12–22 cm. longi, pilis pallide flavis ubique dense pubescentes, graciles, laxiflori ; bracteae minutae, mox caducae, ovatae vel ovato-lanceolatae, plus minusve acuminatae, ad 1·6 mm. longae, basi circiter 0·75 mm. latae ; pedicelli ascendentes vel maturitate patentes, fragiles, 2·5–4·3 cm. longi, praesertim sub floribus dense pilosuli. *Sepala* ovato-oblonga, 1·3–1·45 cm. longa, 1–1·05 cm. lata, extra sparse pubescentia et densius minute velutino-puberula, siccitate flavescenti-olivacea. *Petala* ut videtur flava, ungue 3–4 mm. longo, lamina ovato-oblonga, basi rotundato-attenuata vel majora cordata, 1·8–2·2 cm. longa, 1–1·3 cm. lata, venis siccitate fuscis haud conspicuis extra pubescentibus, ceterum glabra. *Stamina* 3 inferiora longiora antheris 4 mm. longis, loculis longitudinaliter dehiscentibus dorso tantum pilosulis ; 4 intermedia antheris 5 mm. longis, loculis ubique copiose pilosulis, basi appendicibus per poros lineares dehiscentibus praeditis ; 3 superiora parva, imperfecta, sparse pilosula et fere glabra. *Ovarium* pilis albis mollibus patulis dense villosulum. *Fructus* teres, 35–48 cm. longus, 1–1·25 cm. diametro, insigniter dense mollissime griseo-velutino-tomentosus, haud transverse rugosus, facile praesertim per fissuras transversas decorticans ; semina brunnea, 7–8 mm. longa, 5·5–6·5 mm lata.

Mexico. State of Mexico : District of Temascaltepec ; Nanchititla, on cliff, shrub 2 m. high, fl. and fr. Feb. 23rd, 1933, *Hinton* 3440 (typus) ; Limones, 960 m., by the trail, shrub 2·5 m. high, fr. Jan. 30th, 1934, *Hinton* 5570 ; Ixtapan, fl. and fr. May 3rd, 1935, *Hinton* 7727.

A most interesting species, perfectly distinct from the comparatively few other American representatives of *Fistula* (*Cassia vera* of Britton and Rose in the North American Flora). In size and indumentum of the fruit it resembles the South Tropical African *C. abbreviata* Oliv. *C. regia* Standley, of Panama, differs in the acute leaflets, shorter pedicels, and much smaller flowers and anthers ; its sepals, moreover, dry purple. *C. moschata* H.B.K. and *C. leiandra* Bth. have very different flowers and fruits.

Cassia (*Peiranisia*) **trichocraspedon** *Sandwith* sp. nov.; *C. Quiedondilla* Micheli atque *Peiranisiae Palmeri* Britton affinis, ab illa indumento foliorum, forma foliolorum, petalis extra pilosis, indumento ovarii, fructu angustiore margine tantum ciliato differt ; ab hac numero forma indumentoque foliolorum, indumento ovarii fructusque differt.

Frutex, c. 1 m. altus, ramulis velut petiolo rhachi petiolulisque foliorum pilis patulis plerumque sursum arcuatis copiose pubescentibus. *Stipulae* filiformi-subulatae, pilosulae, 5–6 mm. longae. *Folia* 8–14 cm. longa, petiolo 0·7–1·5 cm. longo ; rhachis internodiis ad 1·5 cm. longis sed saepe multo brevioribus, glandulis singulis inter jugum imum atque summum, rarius inter juga bina inferiora, foliolorum clavatis vel elongato-subulatis et ad 4·5 mm. longis ;

petioluli 1–2 mm. longi ; foliola paripinnata, 9–11-juga, anguste oblonga vel oblongo-lanceolata, apice attenuata acuta vel obtusa apiculata, nonnunquam acute acuminata, basi plus minusve (nonnunquam obtuse) cuneata, 1·3–4·2 cm. longa, 0·35–1·3 cm. lata, adulta firme chartacea, utrinque copiose subadpresse pilosulo-pubescentia, nervis principalibus utrinque prominulis, rete venularum supra saepius impresso subtus manifesto. *Inflorescentiae* ex umbellis bifloris compluribus ex axillis foliorum orientibus et apice ramulorum nondum foliato paniculam formantibus compositae ; umbellae pedunculo sparse patenter pilosulo 0·8–2·2 cm. longo, glandulis 2–3 inter bases pedicellorum plus minusve clavatis acutatis vel apiculatis ; bracteae ovatae, cymbiformes, pilosulae, circiter 2·3 mm. longae, mox deciduae ; pedicelli sparse pilosuli vel fere glabri, vulgo 1·2–2·3 cm. longi. *Flores* 3·5 usque fere 4·5 cm. diametro. *Sepala* ciliata, ceterum omnino glabra vel juventute sparsissime pilosula, suborbicularia, 5–9·5 mm. longa, 4·5–9 mm. lata. *Petala* valde inaequalia, majora ad 2·8 cm. longa et 2 cm. lata, omnia extra satis copiose pilosula, intus glabra. *Stamina* 3 inferiora longiora antheris 6–7 mm. longis rostro 2–3 mm. longo terminatis ; 4 superiora antheris 5 mm. longis ; 3 staminodia laminis vix 2 mm. longis. *Ovarium* glabrum sed marginibus dense villoso-ciliatis, stipite glabro vel sparse pilosulo. *Legumen* 9–12·5 cm. longum, 6·5–8 mm. latum, basi in stipitem 6–8 mm. longum attenuatum, glabrum sed marginibus conspicue copiose patenter pilosulo-ciliatis, stipite pilosulo-pubescente.

Mexico. State of Mexico : District of Temascaltepec ; Ypericones, on hill, fl. and fr. Feb. 1934, *Hinton* 5582 (typus) ; *ibid.*, in oak woods, c. 1600 m., fl. Dec. 1932, *Hinton* 2972 ; *ibid.*, in oak woods, fl. and fr. March 1934, *Hinton* 5742 ; Tempincla, fl. and fr. March 1932, *Hinton* 355.

Well characterized in this group by the shape and indumentum of the leaflets, the petals hairy on the back, and the conspicuously ciliate ovary and fruit.

Mimosa egregia *Sandwith*, sp. nov. ; *M. spirocarpae* Rose speciei singulari sinaloensi certe affinis, fructu longiore recto vel leviter arcuato nec arcte spiraliter curvato primo visu distinguitur ; praeterea pinnis 2–3-jugis tantum, foliolis pro rata majoribus in pinna nunquam 3-jugis, seminibus majoribus gaudet.

Frutex 1·5–4 m. altus, inermis vel verosimiliter sparse armatus, ramulis hornotinis foliis inflorescentiisque ubique ut in *M. spirocarpa* dense pallide velutino-pubescentibus. *Folia* petiolo eglanduloso 2·2–4 cm. longo ; internodia rhacheos 2·8–4·8 cm. longa ; pinnae 2–3-jugae, petiolis jugorum inferiorum 0·4–1 cm. longis superiorum ad 2 cm. longis ; petioluli foliolorum brevissimi ; foliola pinnarum imarum 1-juga, superiorum 1–2-juga, oblique ovata vel obovata, apice obtusa vel rotundata atque minute apiculata, basi obliqua latere superiore cuneata rotundata inferiore, 2·1–4·7 cm. longa, 1·5–3·8 cm. lata, chartacea, utrinque praesertim subtus dense

molliter subadpresse pubescentia, subtus velutina, basi palmatim 3–4-nervia costa excentrica, nervis omnibus utrinque prominulis. *Paniculae* longissimae, 22–40 cm. longae. *Spicae* numerosissimae, in quoque fasciculo 2–4, 7–9·5 cm. longae. *Flores* roseo-purpurei vel albidi. *Calyx* extra sericeo-pubescens, 1 mm. longus. *Corolla* extra sericeo-pubescens, tota 2 mm. longa, lobis 1 mm. longis. *Stamina* 10. *Ovarium* oblongum vel obovoideo-oblongum, circiter 0·7 mm. longum, apice sericeum, ceterum glabrum vel glabrescens ; stylus glaber, 7 mm. longus. *Legumen* rectum vel leviter arcuatum, 2·3–4·3 cm. longum, 4–5 mm. latum, ubique dense pallide velutino-pubescens, marginibus incrassatis, inter semina vulgo 4–8 vallibus transversis angustis profundis articulatum. *Semina* fusco-pulla, nitentia, 3–3·3 mm. lata, eis *M. spirocarpae* valde similia sed majora.

Mexico. State of Guerrero : district of Coyuca ; El Pochote, on hill, fl. July 1934, *Hinton* 6314 (typus floris) ; I. R. F. Quirio, Coyuca, fl. July 1934, *Hinton* 6296 ; *ibid.*, fr. Nov. 1934, *Hinton* 6907 (typus fructus). Described as a shrub 1·5–4 m. high, with pink to white flowers. No. 6907 was collected from the same plant as no. 6296.

Vernacular name, *Espino chacapo*.

Undoubtedly very close to the strange isolated Sinaloan species, *M. spirocarpa*, but immediately distinguished by the fruit, and presumably connecting Britton and Rose's *Spirocarpae* with some other group of species. The fruit resembles that of *M. calcicola* Rob., a species with capitate inflorescences in Britton and Rose's *Monancistrae*. The conceivable hypothesis that *M. spirocarpa* represents a sporting condition of *M. egregia* is not a likely one, since the fruits and seeds of *M. spirocarpa* appear to be healthy and unattacked, and there are other smaller differences in foliage between the two species.

Acacia (*Senegalia*) **cuernavacana** (*Britton et Rose*) *Sandwith*, comb. nov.—*Lysiloma cuernavacana* Britton et Rose in N. Am. Fl. xxiii, pars 2, 78 (1928), excl. fruct.

Mexico. State of Morelos : valley below Cuernavaca, 1200 m., fl. Oct. 1900, *Pringle* 8382 (U.S. Nat. Herb., typus ; Herb. Kew.), distributed as *Acacia acatlensis* Benth., ex char.

State of Mexico : District of Temascaltepec ; Platanal, rare on dry hill, fl. Feb. 1933, *Hinton* 3355, fr. March 1934, *Hinton* 5748. Described by Hinton as a shrub 3–4 m. high, leaning on other plants, and named " Espino."

This is clearly not a *Lysiloma* on account of the free stamens present in the type collection, which, indeed, has a facies far more closely resembling the spicate species of *Senegalia*. The above collections of Hinton are provisionally associated with this species ; they have a few short prickles on most of the branchlets, and elastically dehiscent fruits, characters which would provide final confirmation for the removal of this species from *Lysiloma* to *Acacia*

(sens. lat.). The fruiting collection assigned by Britton and Rose to *L. cuernavacana*, viz. *Rose and Hough* 4354 (U.S. Nat. Herb.), belongs, in the opinion of the present writer, to a different species, and is of course a true *Lysiloma*. The fruits of *Hinton* 5748 are glabrous, brown, slightly pruinose over the seeds, 11–12 cm. long and 1·7–2·1 cm. wide, attenuate to the apex, and attenuate at the base into a stipe 5–7 mm. long.

Styracaceae (A. A. Bullock).

Styrax Hintoni *Bullock*, sp. nov. ; habitu *S. jaliscanae* S. Wats.,* sed corollae lobis valvatis, foliis majoribus, floribus minoribus, filamentis staminum latioribus brevioribusque, stylo glabro differt.

Frutex ramosus, 4 m. altus, partibus junioribus pilis stellatis longis indutus, ramis junioribus ramulisque dense tomentosis. *Folia* alterna, elliptico-oblonga, circiter 12 cm. longa et 6 cm. lata, apice abrupte breviterque acutiuscule acuminata, basi rotundata, supra nervis satis dense pilosa, subtus praesertim nervis dense pilosa vel tomentosa, nervis lateralibus utrinsecus 7–8 ; petioli satis crassi, tomentosi, usque ad 1·3 cm. longi. *Racemi* simplices, tomentosi, pauciflori, ex axillis foliorum superiorum orti, circiter 4 cm. longi ; pedicelli 1–3 mm. longi ; bracteae minutae. *Calyx* cupuliformis, 4 mm. altus, 4 mm. diametro, limbo truncato vel 5-denticulato vel 5-undulato, extra dense tomentosus, intus brevissime sed dense adpresso-sericeus. *Corolla* 1·2 cm. alta, extra breviter sericea, intus glabra ; lobi 5, erecti, anguste oblongi, acuti, circiter 8 mm. longi, aestivatione valvata. *Stamina* 10, inclusa ; filamenta applanata, lineis pilorum longitudinaliter ornata, 2·5 mm. longa ; antherae lineari-oblongae 4 mm. longae, apice obtusae. *Ovarium* breviter sericeum, ovoideo-globosum, 2·5 mm. diametro, basi constrictum, omnino liberum, 3-loculare ; ovula in quoque loculo circiter 7. *Stylus* linearis, 1 cm. longus, glaber, stigmate terminali parvo. *Fructus* non visi.

Mexico. State of Mexico : District of Temascaltepec ; Calera, 770 m., in a wet barranca, a shrub 4 m. high, 19 April 1933, *Hinton* 3798.

Although having a superficial resemblance to *S. jaliscana* S. Wats.,* Mr. Hinton's plant, on account of the valvate aestivation of the corolla-lobes, falls into a different subsection (*Eustyrax* subsect. *Valvatae*) of the genus. The indumentum is also of a looser kind, being composed of very long, spreading, stellate hairs, whilst that of *S. jaliscana* is denser, more closely appressed and consists of much shorter hairs. The ovary appears to remain triocular until a later stage of development than usual.

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*Described by Watson in Proc. Amer. Acad. **26**, 144 (1891), and reduced to *S. officinalis* L. var. *jaliscana* (Wats.) Perk. by Perkins in Engl. Pflanzenr.: Styracaceae, 82 (1907). It is here restored to specific rank.

Adenocalymma Hintoni *Sandwith*, sp. nov.; *A. inundato* Mart. ob connectivum foliaceum ultra thecas productum affinis, foliolis angustius marginatis, calyce breviore, corollae tubo extra pubescentiore, praesertim bracteis latis conspicuis rotundatis optime differt.

Frutex scandens; ramuli summi novelli tenues, teretes, striati, nigrescentes, lenticellis pallidis copiose maculati, minute lepidoti, ceterum glabri vel raro pubescentes; ramuli vetustiores pallide albogrisei, saepe nitiduli, teretes, striati, lenticellati, glabri; consocies glandularum nodis inter petiolos haudquaquam visae; pseudostipulae foliaceae ut videtur nullae. *Folia* trifoliolata, vel bifoliolata cirrho simplici (an semper ?) terminata; petiolus pro aetate ramulis similis, 1·7–6·3 cm. longus; petioluli laterales 0·8–1·8 cm. longi, terminalis pro rata saepe multo longior; foliola ovata vel elliptica vel oblonga, apice obtuse ad 11 mm. sed saepe multo brevius cuspidata, nonnunquam retusa tantum, basi obtusa plus minusve rotundata saepe etiam distincte cordata, 2·5–13 cm. longa, 2·2–7·5 cm. lata, juniora chartacea, adulta vetusta subcoriacea, siccitate olivacea vel saepius plumbea vel fere nigrescentia, utrinque praesertim supra saepius nitidula, tenuiter anguste sed distincte cartilagineo-marginata, juventute satis sparse minute lepidota, serius glabra, nervis primariis utroque costae latere vulgo 6–8 arcuatis ascendentibus, utrinque satis laxe sed conspicue praesertim subtus prominulo-reticulata. *Inflorescentiae* axillares et terminales, racemosae et paniculatae; racemi singuli ad 6 cm. longi, laterales saepe multo breviores, minute superne dense furfuraceo-puberuli, inferne saepe glabrescentes et minute lepidoti; pedicelli 3–6 mm. longi, dense minute puberuli; bracteae magnae, conspicuae, late ovatae, 6–8·5 mm. longae, 5·5–9 mm. latae, extra plus minusve dense minute puberulae necnon sparse lepidotae. *Calyx* campanulatus, 4–6 mm. longus, 5–7 mm. latus, margine fragili facile irregulariter fisso atque lacero, extra dense puberulo-tomentellus, nonnunquam glandulis nigris patelliformibus raris adspersus. *Corolla* lutea, infundibuliformis vel campanulato-infundibuliformis, 4–5 cm. longa, limbo 3·5–4·8 cm. diametro, tubo basi usque 1 cm. angusto tum ampliato atque fauce siccitate 1·5–2 cm. lato, extra basin versus glabrescente sparse lepidoto, sursum extra satis dense conspicue furfuraceo-pubescente, intus glabro nisi zona prope insertionem staminum pubescente, lobis extra pubescentibus intus conspicue lepidotis. *Stamina* supra tubi basin 8·5–10 mm. inserta, basi pubescente excepta glabra; longiora 1·8–2·1 cm., breviora circiter 1·6 cm. longa; thecae antherarum circiter 2·3 mm. longae, angulo recto horizontaliter extrorsum reflexae parallelae, connectivo in lobum foliaceum conspicuum oblongum 1·5 mm. longum producto. *Staminodium* 4·5 mm. longum. *Discus* pulvinaris, usque 2 mm. altus, 2·8–3·3 mm. diametro, glaber. *Ovarium* ovoideo-ellipsoideum, circiter 3 mm. longum atque 2 mm

diametro, lepidotum; stylus circiter 2·7–2·8 cm. longus, basi lepidota excepta glaber; ovula biseriata, in quoque loculo 14 (vel nonnunquam pauciora?). *Capsula* matura oblonga, 10–18·5 cm. longa, 2–3 cm. lata, apice attenuata, basi rotundata, valvis crasse lignoso-coriaceis griseis glabris intricate longitudinaliter corrugulatis crebre lenticellatis nervo mediano percursis. *Semina* transverse oblonga, 1·6–1·9 cm. longa, 5–6·5 cm. lata, glabra, nucleo crasso coriaceo brunneo vel flavo-brunneo, alis latis membranaceis hyalinis sordide albis atque brunneo-vittatis.

Mexico. State of Mexico: District of Temascaltepec; Bejucos, by the river, 610 m., fl. April 1933, *Hinton* 3784 (typus floris); *ibid.*, on llano, 610 m., fl. June 1933, *Hinton* 4137.

State of Michoacan: District of Huetamo; Mal Paso, in barranca, fl. May 1934, *Hinton* 6027.

State of Guerrero: District of Coyuca; Querendas, fl. July 1934, *Hinton* 6281, fr. Jan. 1935, *Hinton* 7259 (typus fructus); Placeres, on cliffs, fr. Jan. 1935, *Hinton* 7252; Cutzamala, barranca, fl. May 1935, *Hinton* 7768. Zihuatanejo, sandy soil, 30 m., fl. Aug. 1898, *Langlassé* 279.

State of Vera Cruz: prov. Cordoba, fl., *Finck* 16.

State of Tabasco: Playas de Paso-ancho, fl. July 1888, *Rovirosa* 240.

Vernacular name, *Bejuco blanco*, according to Rovirosa.

II: New Gesneriaceae (C. V. Morton).*

Through the courtesy of the Director of the Royal Botanic Gardens, Kew, I have been privileged to study an interesting collection of Gesneriaceae made in the State of Mexico by Mr. George B. Hinton. It contains five new species, which are described herewith. The older species collected include *Achimenes pulchella* (L'Hér.) Hitchc., *Achimenes patens* Benth., *Achimenes heterophylla* (Mart.) DC., **Achimenes antirrhina** (DC.) Morton, comb. nov. (*Gloxinia antirrhina* DC., Prodr. vii. 534), *Plectopoma glabratum* (Zucc.) Hanst., and *Kohleria elegans* (Dcne.) Hemsl. Many of these are probably new to the State of Mexico.

Achimenes (Scheeria) bella *Morton*, sp. nov.; caulibus lanatis, foliis superioribus pseudoverticillatis brevipetiolatis crenatis, pedunculis solitariis, calycis lobis elongato-triangularibus acutis, corollis oblique infundibuliformibus caeruleis, disco annulari integro.

Herba tenera, usque ad 13 cm. alta. *Caules* graciles, vix ramosi, circiter 1 mm. diametro, rubescentes, dense lanato-villosi, pilis longissimis (usque 4 mm. longis, circiter 40μ latis), hyalinis, multiseptatis. *Folia* opposita, aequalia, suprema pseudoverticillata, breviter petiolata, petiolo usque ad 10 mm. longo apicem versus marginato dense lanato-villoso; laminae late ellipticae, usque ad 5 cm. longae et 3·5 cm. latae, membranaceae, apice rotundatae,

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basi cuneatae, in petiolum decurrentes, crenatae (basi excepta), dentibus 7–11 utroque latere late rotundatis, supra virides et sparse appresso-pilosae, subtus pallidae et lanatae. *Pedunculi* solitarii, axillares, usque ad 4 cm. longi, graciles, rubescentes, lanato-villosi. *Calycis tubus* brevis, dense lanatus, lobis elongato-triangularibus acutis vix 5 mm. longis extus lanatis intus glabris. *Corolla* caerulea (tubo plus minusve flavo), oblique infundibuliformis, usque ad 2·8 cm. longa, tubo extus sparse piloso basi superiore paullulum gibboso circiter 3 mm. lato sursum abrupte ventricoso, fauce aperto circiter 13 mm. lato, lobis 5 fere aequalibus, circiter 8 mm. basi latis 3 mm. longis late rotundatis vix patentibus integris. *Stamina* 4, didynama, filamentis gracilibus contortis, antheris conniventibus et cohaerentibus, loculis ovalibus vel suborbicularibus discretis explanatis. *Ovarium* (i.e. pars libera) puberulum. *Discus* annularis, integer. *Stylus* crassiusculus. *Stigma* stomatomorphum. *Fructus* deest.

Type in the Kew Herbarium, collected on cliff at Luvianos, Piedra Grande, Distr. Temascaltepec, State of Mexico, Mexico, Aug. 11, 1933, by *G. B. Hinton* (no. 4512).

The only member of the subgenus *Scheeria* previously known, *Achimenes mexicana* (Seem.) Fritsch, is apparently not closely related to the present species, which may be distinguished as follows :

Leaves rounded at apex, crenate, the teeth few, broadly rounded ; stems lanate-villous ; corolla 2·8 cm. long or less.....*A. bella.*

Leaves acute, serrate, the teeth numerous, acute ; stems hirsute ; corolla about 4 cm. long.....*A. mexicana.*

Achimenes (Dicyrta) fimbriata *Rose*, sp. nov. in sched. ; caulibus foliisque glabris, foliis cujusve paris valde inaequalibus leviter serratis, calycis tubo et segmentis glabris, segmentis lineari-lanceolatis, corollis infundibuliformibus albis, lobis magnis conspicue denticulatis, dentibus glandulosis, disco annulari integro.

Herba tenera, usque ad 30 cm. alta. *Caules* teneri, vix 1 mm. crassi, rubri, glabri, non ramosi. *Folia* opposita, cujusve paris valde inaequalia ; folii alteri lamina ovata vel ovato-lanceolata, usque ad 5 cm. longa et 2·6 cm. lata, apice acuminata, basi obtusa saepe obliqua, fere usque ad basin leviter serrata, supra viridis, subtus pallida, saepe rubescens, utrinque glabra, nervis secundariis 4–6-jugis arcuatis, petiolata, petiolo gracili usque ad 22 mm. longo glabro rubro ; folium alterum parvum vel interdum auriculiforme, lamina saepe lanceolata acuminata vix petiolata. *Flores* axillares, solitarii, pedicellis tenuibus glabris usque ad 10 mm. longis. *Calycis tubus* ovario adnatus, obconicus, circiter 3 mm. longus, glaber, lobis lineari-lanceolatis basi (0·5 mm.) connatis 3–5 mm. longis glabris patulis integris. *Corolla* alba, basin versus interdum purpureo-punctata vel lineata, tubulosa, plus minusve infundibuliformis, usque ad 2 cm. longa, glabra, tubo basi circiter 2·5 mm.

lato non saccato sursum ampliato, fauce usque ad 10 mm. lato, lobis magnis rotundatis margine conspicue eroso-denticulatis, dentibus glandulas flavescentes sessiles gerentibus. *Stamina* 4, didynama, filamentis basi corollae tubi adnatis contortis glabris, antheris connatis, loculis ovalibus discretis. *Stylus* rectus, glaber. *Stigma* stomatomorphum. *Discus* annularis, crassiusculus, integer, glaber.

Type in the U.S. National Herbarium, no. 305438, collected at Lodiego, Sinaloa, Mexico, Oct. 9–15, 1891, by *Edward Palmer* (no. 1622).

The following additional specimens have been examined: San Lucas, Distr. Temascaltepec, State of Mexico, Mexico, Sept. 14, 1933, *Hinton* 4753; Anonas, Distr. Temascaltepec, Mexico, alt. 880 meters, Sept. 9, 1933, *Hinton* 4728; Camino de los Brasilitos, Ixtagua, San Ignacio, Sinaloa, alt. 600 meters, Aug. 17, 1918, *Montes & Salazar* 484; Batel, Concordia, Sinaloa, alt. 1660 meters, Sept. 1919, *Dehesa* 1630; Cuernavaca, Morelos, Sept. 10, 1903, *Rose & Painter* 6935.

Easily distinguished from the other species of the subgenus *Dicyrta* by its glabrous stems, leaves, and calyces, and by its denticulate corolla lobes. The teeth are bordered by a row of minute sessile yellowish glands.

Achimenes (Dicyrta) flava *Morton*, sp. nov.; caulibus gracilibus vix ramosis, foliis inaequalibus oblique ovatis utrinque sparse pilosulis, floribus axillaribus solitariis, calycis segmentis lanceolatis interdum pilosulis, corollis flavis parce maculatis, lobis magnis patentibus integris, disco annulari integro.

Herba gracilis, usque ad 25 cm. alta. *Rhizoma* squamosum. *Caules* tenues, rubescentes, subflexuosi, usque ad 1·5 mm. diametro, subpilosi, vix ramosi. *Folia* cujusve paris valde inaequalia, petiolata, petiolo usque ad 9 mm. longo piloso; laminae majores oblique ovatae, usque ad 7 cm. longae, basi subrotundatae, apice attenuatae, margine perspicue serratae, supra lutescenti-virides et sparse pilosulae, subtus pallidiores, praecipue in venis pilosulae vel fere glabrae, minores interdum subsimiles sed plerumque redactae et lanceolatae, circiter 1 cm. longae, brevissime petiolatae. *Pedicelli* axillares, solitarii, circiter 20 mm. longi, capillares, pilosuli, pilis saepe glanduliferis. *Calycis tubus* obconicus, circiter 1·5 mm. longus, sparse pilosulus vel glabratus, lobis lanceolatis, circiter 3 mm. longis, integris sparse pilosulis vel glabratis. *Corolla* flava, usque ad 22 mm. longus, hypocrateriformis, tubo basi circiter 2·5 mm. lato non saccato sursum gradatim ampliato rubro-maculato pilis paucis hyalinis septatis instructo, fauce aperto usque 8 mm. lato, lobis magnis patentibus integris. *Filamenta* glabra, contorta. *Antherae* connatae, loculis discretis suborbicularibus explanatis. *Ovarium* (i.e. pars libera) glabrum. *Stigma* stomatomorphum. *Discus* annularis, crassus, integer, glaber. *Fructus* deest.

Type in the Kew Herbarium, collected at Ypericones, Distr. of Temascaltepec, State of Mexico, Mexico, Aug. 5, 1933, by *G. B. Hinton* (no. 4485). A second collection, *Hinton* 1776, is from Limones, Distr. of Temascaltepec, alt. 910 meters, Sept. 19, 1932. The type bears the notation "on cliffs," and the later collection "in the water."

The following collections in the United States National Herbarium are also to be referred to this species: Near Pedro Paulo, foothills of Sierra Madre, Tepic, Aug. 3, 1897, *Rose* 1977; between Aguacate and Dolores, Tepic, Aug. 6, 1897, *Rose* 3354; La Laja, Michoacán or Guerrero, alt. 500 meters, Sept. 21, 1898, *Langlassé* 368; Cafetal Calvario, Cerro Espino, Distr. Pochutla, Oaxaca, alt. 600 meters, Sept. 20, 1917, *Reko* 3481 p.p.

Related to **Achimenes saxicola** (*Brandegee*) *Morton*, comb. nov. (*Kohleria saxicola* Brandegee in Univ. Calif. Publ. Bot. vi. 66). This species was described under *Kohleria*, because of an erroneous observation that the disk was composed of 5 distinct glands. However, I have examined two sheets of the type collection (*Purpus* 6853, from Finca Mexiquito, Chiapas, Mexico) and find that the disk is invariably annular and entire. The habit, also, is entirely that of *Achimenes*, subgenus *Dicyrta*. Brandegee later (op. cit. 193) reduced *K. saxicola* to synonymy under *Diastema rupestre* Brandegee. I have examined a specimen of this latter species and find it to be a true *Diastema* and therefore quite unrelated. *Achimenes saxicola* may be distinguished from *A. flava*, to which it is closely related, by the pubescent free part of the ovary and by its coarser pubescence. The leaves of *A. saxicola* are strigillose on the mesophyll beneath, but those of *A. flava* are merely finely pilosulous on the veins or often glabrate.

Achimenes (Dicyrta) obscura *Morton*, sp. nov.; ex affinitate *A. candidae* sed caulibus villosulis stramineis, foliis fere aequalibus minoribus crenatis vel raro crenato-serratis, corollae tubo non gibboso, annulo integro distinguenda.

Herba tenera, usque ad 23 cm. alta, non ramosa, caulibus stramineis sulcatis villosulis circiter 1·5 mm. diametro. *Petiolus* gracilis, usque ad 4 cm. longus, laminam saepe fere aequans, villosulus. *Folia* cujusve paris subaequalia, petiolata, petiolo usque ad 4 cm. longo dense villosulo; laminae oblique ovatae, vel raro oblongae vel suborbiculares, maximae 7 cm. longae et 4·5 cm. latae, apice acutae, interdum obtusae vel rotundatae, basi obtusae vel raro acutae, membranaceae, crenatae vel crenato-serratae, supra virides et pilis minutis sparse instructae, pilis majoribus paucis interspersis, subtus pallidiores, puberulae. *Pedicelli* axillares, solitarii, basi saepe bracteolati, usque 10 mm. longi, dense glanduloso-villosuli. *Calycis tubus* obconicus, circiter 2 mm. longus, dense glanduloso-villosulus, lobis lineari-lanceolatis circiter 4 mm. longis integris acuminatis villosulis. *Corolla* alba, plus minusve maculata, circiter

16 mm. longa, hyprocrateriformis, tubo basi non saccato 2·5 mm. diametro, sursum paullulum ampliato sparse puberulo, fauce circiter 8 mm. diametro, lobis magnis patentibus integris. *Stamina* 4, didynama, filamentis contortis glabris, antheris conniventibus, loculis discretis ovalibus. *Ovarium* (i.e. pars libera) puberulum. *Stylus* puberulus. *Stigma* stomatomorphum. *Discus* annularis, integer.

Type in the Kew Herbarium, collected at Salitre Cañitas, Distr. of Temascaltepec, State of Mexico, Mexico, alt. 1050 meters, Sept. 6, 1933, by *G. B. Hinton* (no. 4705). An additional specimen in the United States National Herbarium was collected at Cafetal Calvario, Cerro Espino, Distr. Pochutla, Oaxaca, alt. 600 meters, Sept. 20, 1917, *Reko* 3481 p. p.

Related to *Achimenes candida* Lindl.,* but that species is said to have terete glabrate stems with only a few scattered spreading hairs near the upper end. In *A. candida* the annulus is interrupted dorsally, and the leaves are larger and more obviously serrate.

Niphaea mexicana *Morton*, sp. nov. ; caulibus non ramosis fere glabris, foliis petiolatis dentatis supra strigosis, pedunculis solitariis, corollis rotatis, lobis ovalibus obtusis.

Herba tenera, usque ad 26 cm. alta. *Caules* plus minusve crassi, 2–2·5 mm. diametro, non ramosi, basi nudi, apicem versus foliati, fere glabri. *Folia* cujusve paris inaequalia, petiolata, petiolo 5–30 mm. longo pilis fuscis multiseptatis villoso ; laminae ellipticae, usque ad 9 cm. longae et 5 cm. latae, membranaceae, apice acutae vel obtusae, basi rotundatae, saepe oblique, perspicue dentatae, dentibus numerosis acutis, supra leviter strigosae, subtus pallidae, venulis pilosulis. *Pedunculus* solitarius, axillaris, tenuis, circiter 3 cm. longus, pilosulus. *Calycis tubus* brevissimus, pilosulus, lobis lanceolatis vel oblanceolatis 4–5 mm. longis integris pilosulis. *Corolla* alba, rotata, circiter 14 mm. diametro, tubo brevissimo, circiter 1·5 mm. longo, lobis ovalibus obtusis membranaceis glabris. *Stamina* 4, aequalia, filamentis rectis 1·7 mm. longis crassis glabris, antheris magnis circiter 1·5 mm. longis et latis erectis introrsum dehiscentibus, loculis apice confluentibus rima longitudinali brevi dehiscentibus. *Staminodium* bene evolutum. *Stylus* gracilis, circiter 4·5 mm. longus, basi pilosulus, stigmate parum incrassato. *Fructus* deest.

Type in the Kew Herbarium, collected at Nanchititla, Distr. Temascaltepec, State of Mexico, Mexico, Aug. 17, 1933, by *G. B. Hinton* (no. 4544).

Related to *N. cupreo-virens* Lem., of which I have seen no material but which apparently differs from *N. mexicana* in several characters, as follows :

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* Journ. Lond. Hort. Soc. **3**, 317, *fig.* (1848)

Stems unbranched ; leaves mostly long-petiolate, never subsessile, sparsely strigose on the upper surface, dentate ; flowers few, solitary ..... *N. mexicana.*

Stems much branched at base ; leaves subsessile, densely velutinous-tomentulose above, crenate ; flowers numerous, subcorymbose. *N. cupreo-virens.*

II—*ADDITIONS TO THE FLORA OF CYPRUS : II.

A. K. JACKSON.

In naming a further collection of specimens recently made by Mr. A. Syngrassides in Cyprus, the following species were found to be unrecorded for the island in Holmboe's " Studies on the Vegetation of Cyprus." Three of the species have not yet been collected by Mr. Syngrassides ; these were noted in the Kew Herbarium while determining his collection.

Medicago ciliaris *Krock.* Fl. Siles. **2**, pt. 2, 244 (1787) ; *Willd.* Sp. **3,** 1411 (1803).

Myrtou, on borders of fields, 6.5.32, *Syngrassides* 452 ; In campis prope Kythraea, Apr. 1880, *Sintenis et Rigo* 475.

Generally distributed in the countries of the Mediterranean.

Echium glomeratum *Poir.* Encycl. **8,** 670 (1808).

In mont. supra Lapithos, 31.5.1880, *Sintenis et Rigo* 623.

Occurs in Asia Minor, Syria and Palestine.

Salvia hierosolymitana *Boiss.* Diagn. Ser. 1, **12,** 61 (1853) ; *Boiss.* Fl. Or. **4,** 627 (1879).

Sub rupibus supra Bellapais, 27.5.1880, *Sintenis et Rigo* 116, Karpas 29.3.30, *C. B. Ussher* 89.

The species is found in Asia Minor, Syria and Palestine.

Allium paniculatum *L.* Syst. ed. 10, 978 (1759).

In vineis prope Evriku, 10.7.1880, *Sintenis et Rigo* 863 ; Pyla, Larnaca distr., in marshy field, 8.6.34, *Syngrassides* 433.

Common throughout the Mediterranean region.

Allium stamineum *Boiss.* Diagn. Ser. 2, **4,** 119 (1859).

In montibus prope Prodromo versus Lemithii, 4.7.1880, *Sintenis et Rigo* 859.

Occurs in Greece, Asia Minor, Syria, Palestine and Persia.

Agropyron elongatum (*Host*) *P. Beauv.* Agrost. 102 (1812) ; *Triticum elongatum* Host, Gram. Austr. **2,** 18 (1802).

Pyla, Larnaca distr. in marshes, on banks of streams, 8.6.34, *Syngrassides* 427.

Common in the Mediterranean countries and South Europe generally.

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* Continued from K.B. 1934. 273.

III.—CONTRIBUTIONS TO THE FLORA OF BORNEO AND OTHER MALAY ISLANDS: V. New and Noteworthy Species from Sarawak, collected by the Oxford University Expedition, 1932.

Burseraceae
(H. J. Lam, Leiden).

(Cf. H. J. Lam in Bull. Jard. Bot. Buitenz. Sér. 3, **12** : 1932)

Canarium Endertii H. J. Lam, *l.c.* 450.

Sarawak. Dulit trail, primary forest on steep spur of mountain, *c.* 600 m. Tree about 16 m. high, 28 cm. diam., fls. crimson, inflorescential axes dark red, 27 Aug. 1932. *Native collector* **1487.**

Vernacular name, *arasa.*

Thus far only known from E. Borneo (Koetai) : endemic.

Compositae
(Jos. Th. Koster, Leiden).

Vernonia phanerophlebia *Merr.* var. **dulitensis** *Koster,* var. nov. ; ramulis dense fusco-villosis, capitulis 6–7-floris.

Sarawak. Mount Dulit, moss-forest, 1230 m., 8 Sept. 1932, *Richards* 1618.

Vernonia arborea *Ham.* var. **grandifolia** *Koster,* in Blumea, **1,** 396 (1935), descr. angl.

Folia late elliptica, apice breviter acuminata (acumine 5 mm. lato subrotundato), basi sensim attenuata, subacuta vel subobtusa, supra sparse pilosa, parce glandulosa, subtus pubescentia (pilis brevibus curvatis basi incrassatis), nervis extremis valde reticulatis utrinque valde prominentibus. *Capitula* 6-flora. *Involucri squamae* glabrae. *Corolla* anguste tubularis, 7–8 mm. longa, lobis 2 mm. longis lineari-lanceolatis acutissimis. *Achaenium* glabrum, minutissime glandulosum, 3.5 mm. longum.

Sarawak. Mount Dulit, bank of stream on edge of cliff, circiter 1200 m., 12 Sept. 1932, *Richards* 1734.

Sapotaceae
(H. J. Lam, Leiden).

Palaquium Richardsii *K. Griffioen et H. J. Lam,* sp. nov. ; ex affinitate obscura forsan nunc cum *P. Beccarii* Pierre (?) et *P. decurrente* H.J. Lam (staminibus 12, ovario 6-loculari), nunc cum *P. stipulari* Pierre et *P. globosa* H. J. Lam comparanda. Ab omnibus ob flores maximos, stamina 25–27 et ovarium 10–12-loculare distincta.

Arbor mediocris ; ramuli crassiusculi, teretes, 0·5–0·9–1·2 cm. crassi, novelli tomentosi, mox glabrescentes ; stipulae semipersistentes, lanceolatae, apice acutissimae, subcarinatae, intus

glabrae, extra marginibus scariosis exceptis tomentosae, 0.9–1·3 cm. longae, basi 0·5–0·8 cm. latae, e foliis adultis iam delapsae. *Folia* magna, ad ramulorum apices subconferta, late obovata, chartacea, basi acuta, interdum paullum attenuata, apice rotundata, interdum late obtusa vel minime emarginata, marginibus integra saepe plus minusve undulata, supra glabra, siccitate fusca vel fusco-livida, subtus minute denseque sericeo-tomentosa, siccitate ferruginea subnitida, demum subglabra, 14–26·5 cm. longa, 7·7–16 cm. lata, petiolis sericeo-tomentosis, 2–3·3 cm. longis ; costa media supra insulcata, subtus valde prominens ; nervi secundarii utrinque 15–20, angulo 55°–60° e costa adscendentes, supra haud, subtus paullum prominentes, recti, margines versus interdum leviter curvati, diminuti, haud confluentes ; nervi tertiarii transversi, pergraciles, densi, inter sese paralleli, supra vix, subtus paullum conspicui. *Inflorescentiae* fasciculatae, in foliorum delapsorum axillis positae, 4–6-florae ; bracteae deltoideae tomentosae, circiter 1 mm. longae. *Pedicelli* graciles, tomentosi, 2·5–4 cm. longi, apice in calycem dilatati. *Alabastra* subacuto-ovoidea. *Flores* magni, usque ad 2·5 cm. longi stylo 0·5 cm. exserto incluso. *Calyx* biserialis, circiter 1 cm. longus, sepala 3 exteriora sericeo-tomentosa, deltoidea, angulo apicali circiter 60°, 7–8 mm. longa et lata, intus subglabra, interiora 3 ovata vel subrotundata, paullo majora, intus subglabra, extra medio tantum tomentosa marginibus late scariosis. *Corolla* intus glabra, infundibuliformis, extra marginibus petalorum anguste scariosis exceptis dense sericeo-tomentosa, 1·8 cm. longa ; tubus brevis, 2–3·5 mm. longus ; petala 6, oblonga, apice subacuta, circiter 1·3–1·6 cm. longa, 0·5–0·6 cm. lata, sinistrorsum convoluta (dextrorsum tegentia). *Stamina* 25–27, seriebus 2 vel 3 indistinctis valde approximatis fauce inserta, 7–9 mm. longa ; filamenta vix pilosa, basi confluentia, 2–3·5 longa, antheris angustis dorso adpresse pilosis 0·5–0·6 cm. longis connectivo 1·5–2 mm. longo acutissimo elongato ornatis. *Ovarium* minute adpresse pubescens, pulviniformis, in stylum gracilem glabrum 2·2 cm. longum post anthesin in calyce inclusum contractum, circiter 10–12-loculatum ; loculi 1-ovulati ; ovula medio axis centralis affixa, sub-campylotropa. *Fructus* ignotus.

Sarawak. Dulit, primary forest by torrent, under 300 m. Tree, 24 m. high, 39 cm. in diam., corolla white, calyx cream-coloured, leaves reddish-brown below, 15 Feb. 1932. *Native collector* 2605 (type in Kew Herb. and Nat. Herb. Leiden).

Vernacular name, *niatoh*.

Palaquium sp. aff. *P. rivulari* H. J. Lam.

Sarawak. Dulit trail, rocky forest near torrent, under 300 m. Tree, *c.* 2·5 m. high, 8 Aug. 1932. *Richards* 1107.

The specimen bears very young buds, but reminds me very much of *P. rivulare* (Bull. Jard. Bot. Buitenz. sér. 3, **8**, 405 : 1927), thus far known from E. Borneo (Koetai) only.

Madhuca Korthalsii (Burck) H. J. Lam var. *typica* H. J. Lam in Bull. Jard. Bot. Buitenz. sér. 3, **7**, 168, 154 (1925) ; **8**, 449 (1927).

Sarawak. Dulit, secondary forest, under 300 m. Tree, *c.* 35 cm. diam., fls. creamy-white with sickly-sweet scent, 31 Aug. 1932. *Richards* 1563.

Distrib.: Malay Peninsula, Sumatra, Borneo.

The specimen represents a relatively small-flowered form of this apparently rather polymorphic species.

Planchonella obovata (R.Br.) H. J. Lam *l.c.* **7**, 209, 245, 266 (1925) ; **8**, 473 (1927).

Sarawak. Dulit, primary forest on crest of ridge, under 300 m. Tree, 20 m. high, 28 cm. in diam., bark shed in long brown flakes, which remain attached at the base of the tree, leaving the trunk yellow and very smooth, looking rather like a *Eucalyptus* ; 5 Feb. 1932. *Richards* 2459.

Vernacular name, *solunsor* (?).

Distrib.: India and S. China to Malay Archipelago, Philippines, New Guinea and Australia.

Cupuliferae

(E. F. Warburg, Cambridge).

Quercus arbutifolia Hick. et A. Cam. in Bull. Mus. Hist. Nat. Paris, **29**, 598 (1923).

Sarawak. Mt. Dulit (4th division), alt. *c.* 1300 m. Shady moss forest. Tree, 19 m. high, 30 cm. diam. *Richards* 1885.

Previously known only from Annam.

Vernacular name: *Impinit Batu*.

Lithocarpus (Sect. **Cyclobalanus**) **sarawakensis** *E. F. Warburg*, sp. nov. ; species zonis cupulae indistinctis irregulariter incrassatis distincta.

Arbor 24 m. alta. *Ramuli* glabri, annotini lenticellis sparsis parvis albidis instructi. *Folia* elliptico-lanceolata, integra, petiolata, 6–10 cm. longa, 3–4·5 cm. lata, apice acumine obtuso curvato praedita, basi cuneata, utrinque glabra, supra paulum nitida, subtus pallidiora ; costa supra aliquanto subtus valde prominens ; nervi primarii utrinque 7–11, supra impressi, subtus prominentes, marginem versus sursum curvati, demum recurvi et ad nervum proximum juncti, nervi minores reticulum subtus satis prominens formantes ; petioli c. 1 cm. longi. *Flores* in spicis axillaribus plerumque apices ramulorum versus aggregatis dispositi, masculi et feminei in spicis distinctis. *Spicae masculae* multiflorae, 4–6 cm. longae, rhachi glabra, floribus solitariis vel geminis vel ternis ; perianthium extra puberulum, intra pubescens, 6-lobatum, lobis triangularibus ; stamina c. 12, filamentis glabris ; ovarium abortivum pubescens. *Spicae femineae* basi floribus masculis paucis saepe praeditae, c.

10 cm. longae, floribus solitariis satis remotis ; perianthium puberulum ; ovarium pubescens, stylis superne glabris subulatis. *Spicae fructiferae* 11–16 cm. longae, fructibus solitariis paucis. *Cupulae* obconicae, sessiles, parte aperta patelliformi, externe c. 1·5 cm., interne 0·5 cm. altae, 2–2·5 cm. diametro, extra tomentosae, intra indistincte pubescentes, annulis 6–9 indistinctis praeditae ; annuli irregulariter incrassati, plerumque os versus et saepe alibi obsoleti. *Glandes* hemisphaericae, quam cupulae paullo latiores, c. 2 cm. altae, parte quarta inclusa, apice acuminatae et umbonatae, furfuraceo-tomentellae ; cicatrix depressa.

Sarawak. Mt. Dulit (4th division), alt. *c.* 700–900 m. Mixed rain-forest on steep slope. Tree 24 m. high, 60 cm. diam. *Native Collector* 1951.

Vernacular name, *Impinit batu* or *Berangan batu*.

Lithocarpus (Sect. **Cyclobalanus**) **sericobalanos** *E. F. Warburg*, sp. nov.; cum *L. induta* (Bl.) Rehd., cujus folia et zonae cupulae similes, comparanda, sed forma cupulae et glandis valde distincta.

Arbor 40 m. alta. *Ramuli* glabri, annotini fusci, lenticellis concoloribus ellipticis sparsis instructi. *Folia* integra elliptica, apice obtuse acuminata, petiolata, 8–13 cm. longa, 4–6 cm. lata, basi late cuneata et acuminata, supra satis nitentia, sparsissime puberula, subtus pallidiora puberula ; costa et nervi supra paulum subtus valde prominentes ; nervi primarii utrinque 10–11, marginem versus sursum curvati et obsolescentes, secundarii plus minusve paralleli, cum tertiariis reticulum subtus paulum prominens formantes ; petioli 1–1·5 cm. longi. *Flores* in spicis in paniculas terminales aggregatis dispositi, spicis inferioribus in axillis foliorum, masculis vel androgynis 5–18 cm. longis ; flores masculi saepissime terni, perianthio 6-lobato, lobis ovatis puberulis, staminibus c. 12 filamentis glabris, ovario abortivo puberulo ; feminei cum masculis duobus singuli, perianthio dense rufo-pubescente, ovario puberulo, stylis brevissimis. *Spicae fructiferae* 6–10 cm. longae, fructibis 1–3 solitariis. *Cupulae* 1·5–3·0 cm. diametro, 1·5–2·0 cm. altae, parte superiore patelliformes, inferiore obconicae, subsessiles, c. 8-zonatae ; zonae integrae, haud incrassatae, puberulae, marginibus fuscis, superiores angustae, inferiores triplo vel quadruplo latiores. *Glandes* depressae, apice concavae, umbonatae, paulum exsertae, c. 1 cm. altae, 2·5 cm. diametro, pallide brunneae, dense pallide sericeo-tomentellae ; cicatrix convexa, magna.

Sarawak. Mt. Dulit (4th division), near Long Kapa, 13 Aug. 1932. Rocky primary forest. Tree estimated as 120 ft. high, diam. 3 ft. at 3 ft. from ground. Bark rather rough, scaling in small longitudinal flakes, yellowish-brown. Crown wide-spreading. *Richards* 1241.

Vernacular names, *Impinit, Alun* (Kenyah).

Castanopsis lentiginosa *E. F. Warburg*, sp. nov.; affinis *C. feroci* (Roxb.) Spach, a qua lenticellis magis numerosis majoribus,

nervis paucioribus, spinis cupulae brevioribus, nuce tomentosa, inter alia differt.

Arbor 23 m. alta. *Ramuli hornotini* stellato-pubescentes, annotini glabri, fusci, lenticellis magnis numerosis prominentibus albidis saepe confluentibus. *Gemmae* subglobosae, ad 3 mm. longae. *Folia* ovata, integra, 5–11 cm. longa, 2–4·5 cm. lata, apice acuminata, basi cuneata et secundum petiolum 1 cm. longum breviter decurrentia, supra haud nitida, glabra, subtus dense rufo-puberula et sparse fusco-lepidota ; costa et nervi supra paulum impressi, subtus valde prominentes ; nervi utrinque 5–7, sursum curvati, marginem versus obsolescentes ; nervi minores haud conspicui. *Spicae floriferae* 2–4·5 cm. longae, dense stellato-pubescentes. *Flores* solitarii vel bini vel terni ; masculi perianthio 6-lobato pubescente lobis ovatis, staminibus c. 12 filamentis glabris perianthio longioribus; feminei perianthio 3-lobato pubescente, ovario pubescente ; styli desunt. *Spicae fructiferae* 6–8 cm. longae, fructibis paucis. *Cupula* subglobosa, 2 cm. diametro (spinis exclusis), rufo-tomentosa, superficie inter spinas satis visibili, spinis satis crassis prope basin 3–7-furcatis tomentosis ad 5 mm. longis, pedicello 3 mm. longo. *Nux* unica rufo-tomentosa.

Sarawak. Mt. Dulit (3rd division), Ulu Koyan, alt. 800–900 m., 18 Sept. 1932. Heath forest. Tree, 23 m. high, 33 cm. diam. Older leaves pale reddish-brown below. *Native Collectors* 1923.

IV—SPARTINA TOWNSENDII AND S. BRASILIENSIS IN WARM COUNTRIES. James Bryce

Spartina Townsendii

In response to requests from various persons, firms and public bodies, a considerable quantity of rooted offsets and seeds have, since 1927, been sent from England to various places in and near the tropics.

Each consignment with which I was concerned was accompanied by a request for some information of the results. Comparatively few replies have so far been received. Only in one case known to me—Honolulu—do the subsequent records give any promise of a permanent establishment. In view of this, some account of the attempts to establish and exploit this grass may be instructive and of interest.

Tobago and Trinidad.

The object of this introduction was stated to be to colonise certain sea-swamps in the hope of effecting an improvement in the healthiness of the neighbourhood and as a preparation for possible reclamation later.

Fifty offsets were taken out in April, 1933. Forty-seven were set in a small swamp on the Trois Riviere Estate, Tobago, and three in the Corvai Swamp near Port of Spain, Trinidad. On May 1st,

1933, a report stated : " After only one week the plants are showing growth of about a couple of inches in some cases." I have since heard indirectly that the Tobago plantation proved a failure.

British Guiana.

In July, 1930, twenty-four plants were sent. A report dated June, 1931, stated that three plots of eight plants each were set out—" Plot A was on a sandy area of shore only covered by higher tides. After two months all plants here died. Plot B was on a bare patch of mud, also covered only by spring tides. The plants at first just held their own, and at the end of last year four had survived, though they had not spread. Now, however, only one or two shoots a few inches in height are visible. Plot C was on a bare patch of mud covered by every tide. At first the plants appeared to be establishing themselves in this situation. But at present, though four plants still survive, there has been little or no tendency to spread."*

Venezuela.

One hundred and fifty offsets were shipped in July, 1932.

In June, 1933, the following account was received :

" The roots were planted at the end of July, 1932. In order to ascertain under what conditions they could be used to most advantage, the plants were set out in three plots, each under quite different conditions, and each properly fenced in as a protection against cattle.

The first plot was placed at the foot of a dyke, situated some distance inland, which serves to divert flood-water from the interior. At some 15 m. distance there is a canal running parallel to the dyke. The rice grass at this location was watered for some time after being planted, but died towards the end of September, 1932. At this time of year there was water in the canal, but none at the foot of the dyke. The opinion is expressed that most probably this site, the soil of which consisted of hard clay, was too dry for this species of grass.

The third plot was located on the lake shore in front of an earth dyke. The soil in this area is light yellow clay, and conditions were considered to be very favourable. This plot was also watered and for some time the grass seemed to grow well, especially at the foot of the dyke where the soil was moist. Some of the plants produced flowers, but they never became robust. This area is slowly subsiding, and the grass has gradually disappeared under the salt lake water. At present there are only three sickly-looking plants left on the bank.

From the results obtained the local management in Venezuela conclude that rice grass is unable to acclimatise itself there, probably owing to soil conditions."

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* Martyn refers more fully to these plants and to *S. brasiliensis* in two recent papers, (1) and (2).

General view of 21 months old clumps of *S. Tenacissimus* on Hanmiliua.

Nearer view of single clump at an earlier stage.

To face page 2]

Antigua, Barbados and Bermuda.

Small consignments of offsets have been sent to Antigua " for reclaiming mangrove swamps," to Barbados for " filling up some salt marshes having no surface connection with the sea," and to Bermuda, purpose not known. No record of the fate of these plants has been received.

Honolulu.

(1) In January, 1931, between two and three pounds of seed from Essex were sent to the Forestry Department, despite a recommendation that offsets would probably be much more satisfactory. No information whether this seed produced plants or not has been received. An opinion on the value of seed in this connection is given later.

(2)* In February, 1933, offsets from Poole were planted in a swamp and all were stated to have become successfully established. By November, 1934, each had spread to cover an area of about three feet in diameter, and promised to extend to at least eight feet in a year's time.

This rate of growth easily exceeds that obtained in this country in favourable situations where an extension of diameter of one foot per annum is a very good average. The correspondent in Honolulu (Mr. S. R. Damon) believes the rapid growth to be " due to our warm water and sun."

Sudan.

In February, 1933, five hundred offsets were supplied to the Department of Agriculture for the " reclamation of salt lands " in the Kassala Province. The decision to make this experiment was based partly on the success which has been achieved in growing *S. Townsendii* on inland salt lands in the Riverina District, New South Wales. Similar attempts have been made in India, presently to be described. In each the object was to provide food for sheep and cattle.

Two hundred and fifty plants were set at Tokar on the Red Sea and a similar number at Kassala with the following results.

(*a*) *Tokar.* Towards the end of March, 1933, the plants seemed to be slowly dying. It was thought that " the soil and the water of Tokar town were not quite salt enough for them."

(*b*) *Kassala.* Fifty plants were set in " normal soil and watered with normal water as a control." The rest were planted in very salt soil in a garden and watered with salt water. The control plants had almost perished by the end of March, 1933. At that time the remaining two hundred were all " looking well-established and flourishing."

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* I am indebted to the Royal Botanic Gardens, Kew, for this information and illustrations.

A later report stated that at Tokar " about half the plants appeared at first to take. But then white ants appeared and made a clean sweep."

" The plants at Kassala, except the controls, ' took ' without a single exception, and seemed to be definitely established. But towards mid-April, as the heat increased, they wilted, and the advent of the hot dust-storms worried them still more. Extra watering and a certain amount of protection proved useless. The last survivors expired early in June, 1933.

In view of the fact that the grass flourished exceedingly in March and collapsed in April and May, it may be that the limits of its powers of endurance are reached at a temperature of about 104°F. In addition there was in the latter two months a good deal of hot, dusty wind, which was absent in March.

The following temperature figures (presumably ' shade ') may be of interest as regards Kassala :—

	Average Maximum	Highest Maximum
March ...	102·5°F.	106·7°F.
April	105·3°F.	113·4°F.
May	104·7°F.	112·1°F.

INDIA.

(1) *Punjab.* In 1932, seeds and offsets were sent out at the request of the Director of Agriculture for experiment for " prevention by vegetation of denudation caused in the sub-montane districts by hill torrents and the utilization of certain large areas which contain sodium salts to such an extent as to put them out of cultivation since the ordinary crops will not grow on them."

A year later information was received that " seed and plants were tried, but the former failed to germinate and the latter died in spite of all possible care."

In 1933, the Director of Irrigation Research became interested in the possibility of utilising salt lands. Late in the year five hundred offsets of *S. Townsendii* and one hundred plants of *Glyceria maritima*, the latter on my suggestion, were despatched.

The types of soil in which they were planted and the objects of the experiment may be gathered from the following extract dated December, 1933.

" The plants arrived here in good condition and on placing in water they have sprouted. Everything so far is satisfactory.

The plants are being set on three types of land :—

(i) What is known out here as ' Rakkar ' soil. This is a hard soil, pH value of about 10·0, and a very low soluble salt content.

(ii) ' Thur ' soil. This soil is high in salts but the pH value is rarely above 8·0.

(iii) Waterlogged land adjacent to canals. This land may or may not contain much salt, but usually there are fairly large salt patches.

" In the first two cases the object is to obtain a fodder crop during reclamation in addition to actual reclamation performed by the plants themselves.

" In the third case, only an expensive drainage system makes the land suitable for cultivation. If the plants can be successfully grown under these conditions, the drainage system will be done away with and a valuable fodder area in dry seasons obtained."

No further communication has been received.

(2) *Assam.* Seeds and offsets were supplied in 1927 for experiment in the prevention of river erosion. In 1929, a report was received stating that the offsets " were planted on the banks of the Borelli river, part near the water and part higher up in soil specially prepared. The plants were kept watered during dry weather and showed some signs of growth, but eventually rotted and died off. The seed failed to germinate."

(3) *Bengal—Dacca.* Fifty offsets were sent in 1931. I have no information of the object of this experiment or of the fate of the plants.

SINGAPORE.

Between 1927 and 1929 repeated efforts were made to establish *Spartina* by seed and offsets on a muddy foreshore. For this reason and also because considerable detail of the operations is available, the record is given at some length.

Seeds were first sent out from Essex in December, 1927, and from Poole in January, 1928. These were sown soon after receipt in the following way.

" Small holes were made about half inch deep and about five seeds put in each, but without any result whatsoever. Some of the seeds would only have been covered with salt water twice in twenty-four hours for about two hours. Other seed would have been covered for, say, three hours."

On November 13th, 1928, more seed was despatched from Essex, in air-tight containers. An attempt was made to cause these seeds to germinate on the surface of wet mud in a box, but without success.

On November 24th, 1928, a further consignment of seed was sent from Essex. This was set one quarter inch deep in soil in a box and placed under the shade of some shrubs so that they were covered by four inches to six inches of water at each tide. None of these seeds germinated.

In May, 1929, twelve rooted offsets were sent from Essex and arrived in perfect condition. A report received stated : " I carefully planted them over an area of nearly an acre, choosing, as near as possible, mud or clay similar to what was attached to the plants

themselves. Several had nice green shoots and looked most cheerful after they were planted, but I am sorry to say every one of them has died."

The Curator of the Botanic Gardens, Singapore, who was consulted afterwards, gave the opinion that climatic conditions, especially in regard to heat, were the cause of failure.

In April, 1929, a sample of seed was sent at the request of the Director of Agriculture, Straits Settlements and Federated Malay States, but no report on them has been received.

AUSTRALIA.

(1) *Queensland.* Seeds sent to Mackay in February, 1928, failed to germinate. A further supply was sent in December, 1928, the fate of which is not known.

(2) *Western Australia.* In 1930 the Director, Zoological Gardens, South Perth, was interested in the introduction of *Spartina* to the north west swamps of Western Australia. Later in that year he wrote that the Agricultural Department had received some plants and had set them " in likely places along the coast." I have no further news of these.

(3) *New South Wales* (*Riverina District*) *and Victoria.* The purpose of this introduction in 1930 is best set out in the words of my correspondent, Mr. J. W. Campbell, Corobimilla, N.S.W.

> " I am a wheat farmer in the Riverina district. For the past three years we have suffered a partial drought, with the result that grass is almost unknown except in irrigation areas.
>
> " By sinking wells or boring I can get an almost unlimited supply of water very suitable for stock, but after a few applications to grass the latter will die.
>
> " The main impurities in the water are sodium chloride, magnesium sulphate and magnesium chloride.
>
> " I was thinking if your grass will grow when inundated by sea water, that I should be able to cultivate it with the aid of my sub-artesian flow."

In a subsequent letter Mr. Campbell states : " I have in view the possibility of areas of thousands of acres continually covered with water from artesian bores—which, whilst producing stock water destroy large grazing areas."

Analyses of the bore-water and soil in this holding have been made by the Department of Agriculture, New South Wales, and extracts are given below along with certain temperature readings supplied by Mr. Campbell.

Analysis of Bore-water from Corobimilla—1926.

	Parts per 100,000	Salinity
Total Solids (105°C) ...	842·0	·84%
Total Solids (180°C) ...	812·0	
Lime (CaO)	38·0	
Magnesia (MgO)	80·8	

Chlorine	376·2
Sulphuric Acid (SO_3) ...	77·8
Alkalinity expressed in terms of Calcium Carbonate ...	62·9

Note.—The water is unsuitable for irrigation or for ordinary domestic purposes.

Analysis of Soil from Corobimilla—1933.

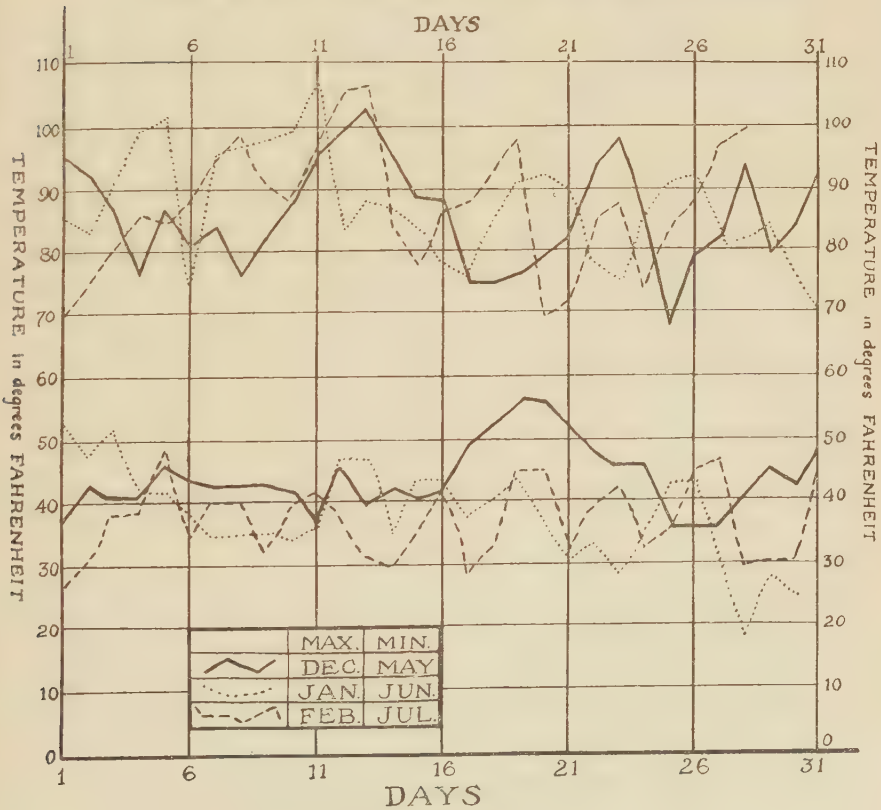
Total water-soluble salts	0·22 per cent.
Containing sodium chloride	0·113 ,,

In July 1930, twenty-four offsets were sent out from Essex.

In November, 1931, Mr. Campbell wrote:

"Twenty were planted in a drain 40-ft. by 4-ft. running from the bore to a water-hole, two (which have not survived) outside the drain, and two under water-level in the hole. Those under water have far exceeded the others in growth.

"Planting out in August (1930) the grass proceeded to



Shade temperature readings at Corobimilla, 1932-33

flower at a height of about 15 inches, but produced no seed. Then, without developing much height it began to shoot out and when winter arrived had increased about fifty times, completely covering an area 36-ft. by 2-ft.

" The first frost checked growth and it was not until late spring that it moved again. It is now making great headway." In August, 1932, Mr. Campbell reported : " We had a plague of grasshoppers that ate the grass right out and while I was waiting for it to grow up again some of my sheep got at it. Then the frosts came and it is practically dormant now."

" The grass continues to spread, but does not make a very high growth except where it is under water all the time. The average height attained in the bore-drain, which, by the way, is as often dry as wet, is about 12 to 15 inches, and at this should make an ideal grazing proposition if sufficient of it were available.

" The soil is red, sandy loam, about 15 inches deep, over a clay subsoil above rock, commonly known here as Bastard Marble. This rock outcrops on some of the rises but is generally about 30 feet below the surface on the flats.

" The country has all been thickly timbered with Cyprus Pine and Grey Box. The Grey Box grows in the lighter rainfall areas in the eastern states and is a Eucalypt.

" The rainfall here is 17 inches and the main products are wheat and wool, except for an area of irrigated land some 20 miles from here, where all kinds of farming are carried on. This is the Leeton and Griffith area and is watered from the dam at Burren Juck on the Upper Murrumbidgee.

" Many acres of this area have been destroyed by being overwatered or otherwise becoming waterlogged, and salt has risen to the surface.

" It was really with the idea of trying out *Spartina* in these areas that I first thought of it."

In August, 1933, Mr. Campbell continued ; referring first to the plants in the bore-drain :

" The seasons 1931–1932, and 1932–1933 were almost a repetition of the year 1930–1931 with the exception that the tendency to multiply seemed increased and the height of the growth lessened with less tendency to flower.

" I have dug the original stems up and some of them are still alive. They were wrapped with silt or clay containing small shells so they can be identified. The plant, or rather stem, failing to seed seems to have become long-lived and hence a heavy growth of very fine grass takes place around the original planting, and it appears as though it would choke itself out in these places in time.

" The distant shoots are heavy and strong-growing like the originals.

"The grass, having developed its full height, seems to remain at that, only increasing the new shoots; but on being eaten down, very rapidly replaces the original amount of growth. "The plants in the water spread very rapidly and grew to about 6 inches above water-level and invariably seeded, or at least flowered, as I did not find any seed. All stems after flowering died down and hence we have a more thinly-spaced tussock of strong growth.

"Recently I had cause to water sheep in that water accumulated in the hole where the plants grew. Close on 30 sheep died on the first day and on tasting the water I found it so salt that it was much stronger than sea water to taste. This was due to evaporation over a period of about seven years. Naturally, I cleaned it out at once, and only after did I think of the value that an analysis of that water would have been to you.

"I had about 500 roots of *Spartina* taken from here and placed in their natural element on river mud-flats in Victoria, and find that the return to the natural state of growth is immediate so far as I can gather from correspondence."

From the foregoing it would appear that *Spartina* may prove to be of very considerable economic value in Australia on account of its ability to form a suitable fodder on inland saline soils. In 1933 the Department of Agriculture became directly interested in the matter and offsets of *Spartina Townsendii* and plants of *Glyceria maritima* were despatched for experiment.

S. Townsendii seems to be able also to adapt itself to tidal conditions in Australia corresponding, presumably, to those to which it is accustomed in this country. In 1930 the Geelong Harbour Trust asked for a supply of plants to be grown on tidal lands which in their "present condition are practically valueless." About 1000 offsets as well as seeds were supplied from Essex. The seed failed to germinate. In regard to the plants a report received in 1932 stated: "So far it is early to advise definite success. The season has of late been wet, causing the positions in which the grass has been planted to be almost inaccessible. Generally speaking the stronger clumps have fared the best." In the autumn of 1932 a further 500 "strong clumps" were despatched.

Sarawak, Hong Kong, New Guinea (Rabaul), Portuguese West Africa (Lobito), South West Africa (Walvis Bay), U.S.A. Texas.

Seeds or offsets have been sent to these countries. I have no information whether propagation was successfully achieved or not.

Notes.

In many parts of the world a demand has arisen, and still exists, for a plant able to grow in soil more saline than the ordinary. When such a soil lies within tidal range the usual object in view

seems to be that of preparation for ultimate reclamation by consolidation and raising of level. In some instances it is also desired, in the interim, to use the plant as a food for farm stock. The latter seems to be the main objective where the saline soil is non-tidal, but also the hope has been expressed that continued cultivation might lead to a reduction in the salinity of the soil: hence the attention which has been directed towards *Spartina Townsendii*, already tested and proved in most of these respects.

From the examples quoted it is evident that most attempts hitherto to grow *S. Townsendii* in, or near, the tropics have been unsuccessful. The recent success at Honolulu was, therefore, all the more unexpected.

In some cases an opinion has been offered in explanation of the results. Only one of these—Singapore—emanated apparently from a botanist. Thus, the failure was attributed in Venezuela " probably to soil conditions " ; in Singapore to climatic conditions, especially heat ; in the Sudan, at Tokar, to insufficient salinity of soil and water followed by an attack of white ants, and at Kassala to high temperature and hot, dusty winds. Oddly enough the success at Honolulu is ascribed to " warm water and sun."

In the absence of sufficient data it is difficult to make a comparison of, or comment effectively on, these results.

It is clear, nevertheless, that the nearest point to the equator at which *S. Townsendii* has been established, and that with marked success, is Honolulu, between latitude 20°–21° north. The failure closest to this latitude was at Kassala in the Sudan (between 15° and 16° latitude, north). The latter station, of course, differs from the former in not being tidal ; but tidal immersion is not necessarily essential, provided that the water-supply has a salinity greater than that of ordinary soil up to about 6 per cent. The salinity at Kassala is not known, but the fact that the plants grew well for several weeks before dying suggests that it was within these limits.

At Honolulu, the success was said to be due to the heat, while at Kassala the failure was put down to the same cause. It would, perhaps, be idle at this stage to carry the discussion further, but a comparison of climatic conditions at least, including the figures for atmospheric humidity, should be of assistance in determining the cause or causes of failure at Kassala, and possibly also at other places in the tropical regions.

In regard to the experiments in the tropics it is extremely likely that climatic factors, while the chief, are not the only ones to be taken into account. In this connection it need only be stated at the moment that there are a number of places in Essex apparently quite suitable for colonisation which have proved uncolonisable. In some instances this has been shown to be due to onslaughts of the common periwinkle (*Littorina littorea*), while in others the immediate cause of failure is thought to be due to great mobility of the surface mud probably caused, in turn, by the nature and direction of the tidal currents in the immediate neighbourhood.

According to my experiments and observations it is possible to establish *S. Townsendii* in tidal regions in this country where the foreshore is of a muddy nature from high water mark of spring tides down to a level about ten feet below that line, provided the population of marine and land herbivorous animals having access to the plant, at least for the early years of establishment, is not so numerous as to cause repeated defoliation, and that the surface mud is sufficiently stable to permit the growth of such plants as *Zostera*, *Vaucheria* and *Rivularia*. In addition, the experience of others has shown that it can also be grown in non-tidal regions of temperate and warm temperate zones, provided the soil has a salinity between about 1 per cent. and 6 per cent., and is not allowed to become parched.

No case is known where *S. Townsendii* has been able to maintain itself, unaided, under fresh water conditions. It is not surprising, therefore, that the several attempts to use it, in both tropical and temperate countries, for ameliorating fresh-water marshy land or for preventing river erosion have failed.

In coming to a decision on the possibility of growing *S. Townsendii* in tropical countries, or in places involving long sea voyages from the country of origin, and in valuing the attempts already made, it is essential to have in mind the viability and germination capacity of the seed, where seed has been the medium employed. Naturally, propagation by seed has distinct advantages in so far as cost and convenience in transport are concerned. But, even allowing that seed can be transported to its destination without loss of vitality, there remains the usually exceptional hazardous nature of the new habitat. Even after one year's growth under normal conditions, the young plants cannot be described as robust or able to stand up to severe conditions as is the case with good offsets from mature plants. With seed, a carefully selected seed-bed is, in my view, essential, and the young plants should not be transplanted until at least the end of their second year's growth.

Repeated germination and keeping tests over a number of years have shown that seed grown in Essex, and stored under ordinary room conditions, has a period of vitality of about fifteen weeks. During this period the germination rate declines rapidly. A good example of performance a little above the average is given in the following table :—

Seed gathered in Essex November 30th, 1932.

Date Sown (in Copenhagen Bath).	Germination Percentage.
December 9th, 1932	82
,, 24th ,,	84
January 6th, 1933	72
,, 21st ,,	60
February 3rd, ,,	24
,, 17th ,,	20
March 3rd, ,,	—

March 17th	,,	...	... 2
,, 31st	,,	...	... —

According to these figures the seed, after a journey of two months, might still be expected to germinate at a rate of about 50 per cent., if sown without delay.

In no case, however, has any of the recipients in the tropics reported a germination of even one seed.

That a long journey involving the passage through the tropics appears to have a depressing effect on the germination rate of *S. Townsendii* may be illustrated with seeds sent to New Zealand. Two samples were desptached, some seeds being kept back from each for testing. Sample A was harvested on November 7th, 1928, and Sample B on November 14th, 1928. Both were posted within ten days of gathering.

	Tested at Chelmsford.		
Dates Set :	14.11.28.	26.1.29.	Tested in New Zealand.
	%	%	
Sample A	56·3	56·0	One gave " 23 per cent.
Sample B	73·5	42·0	and the other less."

The date of the New Zealand test was not stated, but was estimated to be about the end of January, 1929.

There was, therefore, a loss during the voyage, apart from the time factor, of from about 20 per cent. to 30 per cent. A similar depreciation is known to take place in certain grass seeds shipped on a commercial scale from New Zealand to England. I am inclined to the view that in many, if not all, instances it is probable that most of the *Spartina* seeds sent to tropical destinations were inert on arrival.

In 1933, an effort was made to prolong the period of vitality and the best result was obtained by storage at a temperature of 4°C. By this means the period was prolonged to forty-two weeks. So far no opportunity of sending seeds to or through the tropics in cool storage has presented itself, but the method appears to be worth a trial where seeds are specially asked for. In the meantime, offsets are likely to give a more satisfactory test of the possibility of quickly establishing *S. Townsendii* in new areas.

Spartina brasiliensis.

This grass appears to have been used successfully in British Guiana as a forerunner to the mangrove (*Rhizophora*) in efforts to prevent coast erosion, and might therefore be more widely used with advantage in the tropics.

The following description of the method of its employment appears in " Tidal Lands " by Carey and Oliver, and is an extract from an article by Mr. A. W. Bartlett in the " Journal of the Board of Agriculture of British Guiana," vol. 1, no. 3, January, 1908.

" Mr. Junor informs me that he plants the tufts of the grass (*Spartina brasiliensis*) in rows, the rows being six feet apart,

and the plants in the rows separated by a distance of two feet. The depth at which the tufts are planted is about one foot below the surface. The grass spreads quickly, so that in a short time the plants meet to form a patch, the numerous stems of which serve to fix the mud and prevent it from being washed away by the sea. Even should the mud cover up the plants after they have been planted they are able to make their way through it in time."

"When the grass is firmly established Mr. Junor's plan is to plant the seedlings of the mangrove in amongst it. There follows a great development of roots both from the trunk and the branches of the mangrove, which after the manner of flying buttresses, firmly support the tree in the soft mud and enable it to withstand the strongest breezes and the heaviest seas. These aerial roots being more or less curved allow a certain amount of "give" or play, which is often of advantage in enabling a structure to withstand pressure without collapsing. So the mangrove tree is in many ways particularly adapted for growing along muddy sea coasts which are exposed to winds and waves. The young plants grow rapidly, and in a few years will themselves produce a crop of seedlings. The club shaped seedlings are obtainable in abundance along the coast, and should be gathered for planting when they are nearly ready to fall. All the planting that is required is merely to insert the lower pointed end of the seedling in the mud. When the mangrove trees have grown to a fair size they form a close shade, and so far as my observation goes they kill out the "wild rice" (*Spartina*), which appears to require full exposure of the sun's rays for at least a part of the daytime for its successful growth. But by the time that the mangrove trees have reached a sufficiently large size to do this, they will themselves have taken over the functions of the "wild rice" in preventing coast erosion, and hence the latter is no longer required."

Reference should also be made to the two papers by Martyn (1) and (2).

Bibliography

(1) E. B. Martyn. "A note on the foreshore vegetation in the neighborhood of Georgetown, British Guiana, with special reference to *Spartina brasiliensis*." *Journal Ecology*, **22**, 292 (1934).

On pages 296–297, the Spartina Society and its development are described.

On page 298, results of experiments with *Spartina Townsendii* are described.

(2) E. B. Martyn. *Agric. Journ. British Guiana*, **5**, 277–283 (1934). The above paper is reprinted and the following supplementary note is given on page 283. "The above paper having been written in 1932, some further developments have

taken place, which it is of interest to place on record. In the first place, the plants of *Spartina Townsendii* which made such a promising start on the soft mud, were subsequently completely smothered by the local Rice Grass and two other plots set out further up the coast suffered the same fate. *Spartina Townsendii* is apparently not able to compete with *S. brasiliensis* when the two grasses occur together."

V—CONTRIBUTIONS TO THE FLORA OF SIAM. Additamentum XL.

Kadsura ananosma *Kerr* (Schizandraceae) ; *K. chinensi* Hance affinis, floribus majoribus, foliis tenuioribus differt.

Frutex dioicus scandens, floribus exceptis glaber ; ramuli longitudinaliter striati. *Folia* elliptica, apice breviter obtuseque acuminata, basi cuneata, 10–17 cm. longa, 4–8 cm. lata, membranacea, integra, minute glandulo-punctata, subtus secus costam glandulis furfuraceis ornata, nervis lateralibus utrinque 8–10, supra conspicuis subtus prominentibus, rete venularum utrinque subconspicuo, petiolo supra canaliculato, 1·5–2 cm. longo, suffulta. *Pedunculi* 1-flori, solitarii, ex axillis foliorum lapsorum orientes, 1·5–1·8 cm. longi. *Flos* non visus. *Flos* ♂ 2–2·5 cm. longus ; perianthii folia 15, extus leviter pubescentia, margine ciliata, ab exteriore gradatim majora ; exteriora late ovata, 4–11 mm. longa, 2–10 mm. lata ; interiora lorata, apice rotundata, interdum leviter cucullata, ad 22 mm. longa, 8 mm. lata, 2–3 intima paulo minora. *Columna* staminea 1·6 cm. longa, conica, staminibus numerosis, antheribus rotundatis, filamentis brevibus distinctis, praedita, apice in ramulos tenues 10–15, c. 6 mm. longos, divisa.

Doi Angka, c. 1460 m., *Garrett* 940.

The collector notes that the flowers are yellow green, tipped red, smelling of pineapples.

Lobelia leucanthera *Kerr* (Lobeliaceae) ; *L. trichandrae* Wight affinis, sed caule foliisque glabris recedit.

Herba erecta, ad 2 m. alta, superne ramosa, ramis divaricatis. *Caulis* minute striatus, glaber. *Folia* glabra ; radicalia non visa ; caulina sessilia oblongo-oblanceolata, ad 17 cm. longa, 2 cm. lata, apice acuta, leviter acuminata, basi longe attenuata, margine minute calloso-serratula ; folia superiora anguste lanceolata, c. 8 cm. longa, 0·8 cm. lata, superne gradatim minora. *Racemi* terminales et ramos laterales terminantes, ad 8 cm. longi. *Bracteae* inferiores ad 2·5 cm. longae, 0·4 cm. latae, ovato-lanceolatae, margine minute serratulae ; superiores gradatim minores. *Pedicellus* glaber, ad 2 cm. longus, haud bracteolatus. *Calycis* receptaculum 2·5–3 mm. altum, glabrum, obscure costatum ; laciniae lineares, acutae, ad 12·5 mm. longae, 1 mm. latae, margine integrae. *Corolla* purpurea,

c. 27 mm. longa ; tubus intus parce pilosus ; lobi superiores c. 16 mm. longi, lineares, acuti, labium inferius aequantes ; labii inferioris lobi c. 11 mm. longi, apice apiculati. *Staminum* tubus 15 mm. longus, basin versus pilosus ; antherarum tubus 6 mm. longus, pilis albis dense vestitus ; antherae duae inferiores apice penicillatae. *Capsula* semi-globosa, c. 5 mm. diametro, leviter costata.

Nan, Doi Pu Ka, c. 1700 m., in savannah, *Kerr* 4923.

Lobelia palustris *Kerr* (Lobeliaceae) ; *L. taliensi* Diels affinis, distinguitur foliis pro rata angustioribus longioribusque, bracteis floralibus brevioribus.

Herba erecta, simplex, omnino glabra, ad 1·5 m. alta. *Caulis* inferne teres, laevis vel leviter striatus, superne parum costatus. *Folia* radicalia longe petiolata, lamina ad 15 cm. longa, 3 cm. lata, oblongo-lanceolata, basi longe attenuata, apice sub-obtusa, margine distanter minuteque mucronulo-dentata, nervis lateralibus utrinque circa 15, cum nervulis subtus prominulis, supra impressis, petiolo ad 11 cm. longo, anguste alato, suffulta ; folia caulina media oblongo-obovata, ad 13 cm. longa, petiolo 3 cm. longo incluso, 3 cm. lata ; folia superiora superne imminuta, sessilia, lanceolata. *Racemus* simplex, terminalis, densiflorus, ad 20 cm. longus. *Bracteae* 13–22 mm. longae, 3·5–5 mm. latae, flores haud superantes, ovato-lanceolatae, acuminatae, margine minute mucronulo-dentatae. *Pedicellus* 3–5 mm. longus, in medio bracteolis binis minutis, 1 mm. longis, instructus. *Calycis* receptaculum c. 2·5 mm. altum ; laciniae 9–11 mm. longae, 1·5 mm. latae, margine parce calloso-denticulatae. *Corolla* roseo-purpurea, 21 mm. longa, intus basin versus pilis albis parce instructa ; lobi 2 superiores lineares, c. 15 mm. longi, labium inferius trifidum excedentes. *Staminum* tubus 14 mm. longus ; antherarum tubus c. 4 mm. longus, dorso pilis albis parce instructus ; antherae inferiores duae fasciculo pilorum alborum terminantes. *Capsula* fere globosa, erecta, c. 5 mm. diametro, leviter costata. *Semina* ovoidea, vix compressa, haud marginata, superficie minute sulcatula.

Lôi, Kao Krading, c. 1200 m., in open marshy ground, *Kerr* 20113.

Campanula rosmarinifolia *Kerr* (Campanulaceae) ; *C. sylvaticae* Wall. et *C. Robertsonii* Gamble affinis, ab ambobus ramulis robustioribus foliis crassioribus margine revolutis differt.

Herba perennis, caespitosa, ad 35 cm. alta, ramulis erectis cinero-tomentosis a radice crassa lignosa orientibus. *Folia* linearia vel lineari-lanceolata, sicco rigida, apice subobtusa, basi attenuata, sessilia, margine leviter undulata saepius revoluta, supra parce subtus dense pilosa, nervis obscuris, ad 25 mm. longa, 3 mm. lata. *Inflorescentia* terminalis, subcorymbosa, pauciflora, bracteis linearibus 3–5 mm. longis. *Pedicellus* tenuis ad 11 mm. longus. *Calycis* receptaculum 2 mm. altum, obscure costatum, dense breviterque

tomentosum ; lobi 3 mm. longi, margine revoluti. *Corolla* campanulata, coerulaea, 7 mm. longa, ad medium fissa, extus parce pilosa, lobis subacutis. *Stamina* antheris 3 mm. longis, filamentis 1·5 mm. longis, basi dilatatis. *Stylus* puberulus, 5 mm. longus, stigmatibus 3 recurvis. *Capsula* matura non visa.

Kampengpet, Me Lamung, c. 800 m., in open, grassy, rocky ground, *Kerr* 6103.

Vaccinium apricum *Fletcher* [Vacciniaceae–Vaccineae] ; *V. malaccensi* Wight affine sed bracteis minoribus, receptaculo piloso differt ; nec non *V. mekongensi* W. W. Sm. affine sed bracteis majoribus, receptaculo piloso differt.

Frutex ad 3 m. altus (ex *Kerr*) ; ramuli teretes, griseo-brunnei, primo parce puberuli mox glabri, lenticellis numerosis. *Folia* elliptica, apice acuta, basi cuneata vel subrotundata, 2·5–4 cm. longa, 1–2 cm. lata, coriacea, supra brunnea vel viridi-brunnea subtus pallidiora, nervis supra conspicuis, costa subtus prominente pubescente, nervis lateralibus 5–6-paribus subtus subprominulis parallelis, nervulis paucis parum obscuris, margine serrulata, petiolo 1–2 mm. longo puberulo suffulta. *Racemi* axillares et terminales ad 6 cm. longi, rhachi pilosa ; bracteae late lanceolatae vel ellipticae acutae, circa 5 mm. longae 2 mm. latae, margine ciliatae ; pedicelli ad 2 mm. longi puberuli, apice cum receptaculo articulati. *Receptaculum* pilosum 1 mm. altum 1·5–2 mm. diametro. *Calyx* usque ad basim 5-partitus, segmentis deltoideis, extra puberulis, 2 mm. latis, 1 mm. altis, ciliatis. *Corolla* rubicundo-alba (ex *Kerr*) extra puberula, tubus 6 mm. longus, intus tenuiter pubescens ; lobi 1–1·25 mm. longi. *Stamina* 6 mm. longa, filamentis 2·5 mm. longis complanatis piloso-barbatis ; antherae non-aristatae. *Stylus* 6 mm. longus, glaber.

Kanburi, Kao Ri Yai, c. 1600 m., open grassy ground, *Kerr* 10385.

Vaccinium Eberhardtii *P. Dop* var. **pubescens** *Fletcher* [Vacciniaceae–Vaccineae] ; varietas haec nova, ramulis racemisque calycibusque pubescentibus a typo recedit.

Lôi, Kao Krading, c. 1200 m., shrub c. ·5 m. high, flowers white, open sandy ground, *Kerr* 8729.

V. Eberhardii is known to the writer from description and illustration only. Kerr's plant, differing mainly in the points noted has had to be treated therefore, in the meantime, as a variety.

Vaccinium glabrum *Fletcher* [Vaccineaceae–Vaccineae] ; *V. Garrettii* Craib affine sed pedicellis longioribus, corollae lobis glabris differt ; nec non *V. pedicellato* Fletcher affine sed calycis lobis non vel parce ciliatis differt.

Arbor parva circa 6 m. alta (ex *Kerr*) ; ramuli teretes vel obtuse quadrangulares, primo pallide brunnei mox cinerei vel cinereo-brunnei, puberuli vel glabri. *Folia* elliptica rarius ovata, apice

acuta, basi cuneata, 4–8 cm. longa, 2–4 cm. lata, chartacea vel subcoriacea, supra griseo-viridia vel brunnea, nitida, subtus pallidiora, utrinque glabra, venis supra parum elevatis vel tantum subconspicuis, costa subtus prominente, nervis lateralibus 4–5-paribus subtus conspicuis parallelis, margine serrulata, petiolo circa 5 mm. longo supra canaliculato glabro suffulta. *Racemi* axillares, 3–5 cm. longi, rhachi angulata glabra ; pedicelli 7–8 mm. longi, glabri, apice cum receptaculo articulati. *Receptaculum* glabrum, circa 1·25 mm. altum, 2 mm. diametro. *Calyx* usque ad basim 5-partitus, segmentis deltoideis 1·75–2 mm. longis, 1·75 mm. latis, glabris non-ciliatis. *Corolla* alba (ex *Kerr*) extra glabra vel pilis paucis induta ; tubus 7·5 mm. longus intus leviter pubescens ; lobi 1 mm. longi, 1·5 mm. lati. *Stamina* 5·5–6 mm. longa, filamentis 3 mm. longis complanatis piloso-barbatis ; antherae dorso aristis binis sursum directis ornatae. *Stylus* validus, 7 mm. longus, glaber.

Krat, Kao Kuap, c. 600 m., edge of evergreen forest, *Kerr* 17752 (pro parte).

Vaccinium pauciflorum *Fletcher* [Vacciniaceae–Vaccineae] ; *V. urceolato* Hemsl. affine sed inflorescentia minore, floribus paucioribus, foliis minoribus angustioribus differt ; nec non *V. Dunaliano* Wight affine sed floribus paucioribus, foliis acuminatis apice non lineare differt.

Ramuli teretes, grisei, primo pubescentes mox glabri, lenticellis numerosis conspicue elevatis praediti. *Folia* ovata vel ovato-lanceolata, apice acuminata, obtusa, basi rotundata vel cuneato-rotundata, 4–11 cm. longa, 1·5–3 cm. lata, coriacea, utrinque brunnea glabra, nervis supra conspicuis, costa subtus prominente, nervis lateralibus 5–6-paribus cum nervulis subtus inconspicuis, margine integra parum recurva, petiolo circiter 2·5 mm. longo puberulo suffulta. *Racemi* axillares ad 4 cm. longi, flores 3–6 ; bracteae mox deciduae non visae ; pedicelli 10–20 mm. longi puberuli apice cum receptaculo articulati, medio bracteolis binis subopposite lanceolatis, circa 2 mm. longis puberulis muniti. *Calyx* usque ad basim 5-partitus, segmentis ovatis, 3 mm. longis, 2 mm. latis, extra puberulis. *Corolla* immatura 5 mm. longa glabra. *Stamina* 4 mm. longa ; antherae dorso aristis binis 1 mm. longis sursum directis ornatae. *Stylus* 4·5 mm. longus, glaber. *Receptaculum* in fructu 3 mm. altum, 4 mm. diametro, puberulum.

Patalung, Kao Soi Dao, c. 600 m., epiphytic on trees in evergreen forest, *Kerr* 19215 (type). Songkla, Kao Kêo, c. 700 m., *Kerr* 15944.

Vaccinium pedicellatum *Fletcher* [Vacciniaceae–Vaccineae] ; *V. exaristato* Kurz affine, sed petiolo omnino glabro, racemis glabris, pedicellis longioribus differt.

Arbor circa 8 m. alta (ex *Kerr*) ; ramuli obtuse quadrangulares vel teretes, grisei vel griseo-brunnei, glabri. *Folia* elliptica, apice attenuato-acuminata acuta, basi in petiolum attenuata, 5–11 cm. longa, 2–4 cm. lata, coriacea, brunnea utrinque glabra, nervis supra

conspicuis, costa subtus prominente, nervis lateralibus 4–5-paribus subtus prominulis, margine serrulata, petiolo 2–5 mm. longo supra canaliculato glabro suffulta. *Racemi* axillares ad 8 cm. longi, rhachi angulata glabra ; bracteae mox deciduae non visae ; pedicelli glabri 5–7 mm. longi apice cum receptaculo articulati, medio bracteolis binis subalternis linearibus 1 mm. longis muniti. *Receptaculum* glabrum 1· 25mm. altum, 1·5 mm. diametro. *Calyx* usque ad basim 5-partitus, segmentis ovatis 1·75 mm. longis 1·5 mm. latis acutis ciliatis. *Corolla* alba (ex *Kerr*) ; tubus 7 mm. longus extra glaber vel parce puberulus, intra tenuiter pubescens ; lobi 1 mm. longi. *Stamina* 5·5 mm. longa, filamentis 3 mm. longis piloso-barbatis ; antherae dorso aristis binis ornatae. *Ovarium* pilosum 1·5 mm. diametro. *Stylus* 8 mm. longus glaber.

Chiengmai, Mê Wang, c. 1060 m., by stream in pine forest, *Winit* 1386. Doi Ngao, Mûang Chêm, c. 1300 m., common along streams in evergreen forests, *Kerr* 5428 (type).

Vaccinium siamense *Fletcher* [Vacciniaceae–Vaccineae] ; *V. cambodiano* P. Dop affine sed ramulis racemisque puberulis differt.

Arbor ad 6 m. alta (ex *Kerr*) ; ramuli primo pallide brunnei et puberuli mox cinerei vel cinereo-brunnei et glabri. *Folia* ovata, elliptica vel lanceolato-elliptica, apice acuta, basi cuneata vel cuneato-rotundata, 3–8 cm. longa, 1·5–3·5 cm. lata, coriacea, brunnea vel griseo-brunnea saepe viridi-tincta, glabra, nervis supra subconspicuis saepe obscuris, costa subtus prominente, nervis lateralibus 4–6-paribus subtus subprominulis, nervis transversis subtus parce prominulis, margine serrulata vel valde serrata, petiolo 2–5 mm. longo supra canaliculato glabro vel puberulo suffulta. *Racemi* axillares et terminales 4–8 cm. longi, valde puberuli ; bracteae late lanceolatae circa 10 mm. longae, 2·5 mm. latae ; pedicelli puberuli 3–7 mm. longi, apice cum receptaculo articulati, medio bracteolis binis alternis fere 1 mm. longis ornati. *Receptaculum* pilosum 1·25–2 mm. altum, 2–2·5 mm. diametro. *Calycis* lobi glandulosi vel eglandulosi extra pilosi, intra parce puberuli, deltoidei, 1–1·5 mm. lati et longi. *Corolla* alba (ex *Kerr*) extra pilosa, tubus 5·5–7 mm. longus, intus pilosus vel pubescens ; lobi circa 1 mm. longi. *Stamina* 4·5–5 mm. longa, filamentis 2·5–3 mm. longis complanatis piloso-barbatis ; antherae aristatae vel ex-aristatae. *Stylus* 5·5–7 mm. longus, glaber. *Fructus* globosus circa 4 mm. diametro, puberulus.

Ubon, c. 100 m., light evergreen forest, *Kerr* 8341. Rayawng, *Put* 2711. Chantabun, Klung, under 50 m., *Kerr* 1794 (type). Krat, Kao Kuap, c. 600 m., open rocky ground, *Kerr* 17726. *Kerr* 17752 (pro parte). *Put* 2909. Sriracha forest, Nawng Yai Bu, *Mrs. D. J. Collins* 828. Chak Kaw near Nawng Yai Bu, c. 25 m., *Mrs. D. J. Collins* 1687. c. 12 m., buds pink opening white, *Mrs. D. J. Collins* 1824. Nawng Takram, c. 12 m., *Mrs. D. J. Collins*, 2260. Chumpawn, Ban Tung Maha, c. 10 m., evergreen forest *Kerr* 11362. Bang Son, *Put* 1577. Ranawng, Kao Pawta Luang

Kêo, c. 1300 m., open evergreen forest *Kerr* 16946. Langsuan, Tako, *Put* 1676. Nakawn Sritamarat, Sichon, under 50 m., sandy ground, *Kerr* 15667. Ta Samet, in Baeckia heath, *Kerr* 14272. Songkla, sandy ground near sea, *Kerr* 15107. Pattani, c. 25 m., common in sandy ground, *Kerr* 7236.

It will be seen from the description that the above collections represent a very variable species the nearest relationship of which is with *V. Cambodianum* P. Dop. which the writer knows from description only. Sometimes the leaf toothing is very distinct, at others very faint ; there is a variation in the length of the flower and in the length of the anther which sometimes bears awns and at other times is devoid of these ; also the calyx lobes may or may not be glandular. In no case, however, are the young branchlets and racemes glabrous as in Dop's plant.

Vaccinium subobovatum *Fletcher* [Vacciniaceae–Vaccineae] ; *V. viscifolio* King and Gamble affine sed pedicellis erectis non deflexis differt ; nec non *V. eburneo* Ridl. affine sed foliis basi attenuatioribus differt.

Arbor c. 10–20 m. alta (ex *Kerr*) ; ramuli teretes, primo brunnei mox grisei. *Folia* elliptica subobovata vel rarius late lanceolata, apice obtusa, basi longius attenuata, 4–7 cm. longa, 1·5–4 cm. lata, subcoriacea, supra griseo-brunnea viridi-tincta nitidaque, subtus brunnea, utrinque glabra et parce glandulosa, nervis supra subconspicuis, costa subtus prominula, nervis lateralibus 5–6-paribus subtus subprominulis parallelis, nervulis paucis, margine integra parum recurva, petiolo 5–10 mm. longo supra canaliculato ibique pubescente suffulta. *Racemi* axillares ad 10 cm. longi, rhachi angulata puberula ; bracteae mox deciduae ; pedicelli glabri vel puberuli, 3–5 mm. longi, apice cum receptaculo articulati. *Receptaculum* 1 mm. altum 2 mm. diametro, glabrum. *Calycis* tubus fere 0·5 mm. longus ; lobi deltoidei vel ovato-deltoidei, obtusi, circa 1·5 mm. longi, 1·5 mm. lati, ciliati. *Corolla* alba (ex *Kerr*) immatura ; tubus 3·75 mm. longus ; lobi 1 mm. longi. *Stamina* 3 mm. longa, filamentis 1·5 mm. longis complanatis piloso-barbatis ; antherae sine aristis. *Stylus* 4 mm. longus, glaber. *Fructus* globosus 4 mm. diametro, puberulus.

Surat, Kao Nawng, c. 800 m., evergreen forest, *Kerr* 13290 (type). Kao Luang, c. 1200 m., evergreen forest, *Kerr* 15487. Kao Luang, c. 1740 m. *Dr. Eryl Smith* 728.

Vaccinium Winitii *Fletcher* [Vacciniaceae–Vaccineae] ; *V. Garrettii* Craib affine sed corollae lobis glabris, aristis antherarum brevioribus vel absentibus differt.

Arbor parva circa 3·5 m. alta (ex *Garrett*) ; ramuli teretes, primo brunnei mox cinerei vel cinereo-brunnei, glabri. *Folia* elliptica, apice acuta, basi cuneata vel cuneato-rotundata vel rotundata, 4–9 cm. longa, 2·5–4 cm. lata, subcoriacea, sicco griseo-brunnea, venis supra conspicuis, costa subtus prominente, nervis lateralibus 5–7-paribus subtus prominulis parallelis intra marginem anasto-

mosantibus, nervulis inter se satis distantibus subtus prominulis, margine serrulata, petiolo circa 3 mm. longo, supra valde canaliculato suffulta. *Racemi* axillares et terminales, ad 8 cm. longi, rhachi angulata glabra ; bracteae caducae, late lanceolatae circa 5 mm. longae, 1·5–2 mm. latae, margine glandulosae ; pedicelli 2–4 mm. longi, glabri, apice cum receptaculo articulati, medio bracteolis binis subalternis fere 1·5 mm. longis ornati. *Receptaculum* glabrum, circa 1·5 mm. altum, 2 mm. diametro. *Calycis* tubus 0·5 mm. longus ; lobi late deltoidei, acuti, 1 mm. longi, 1·25 mm. lati, glabri. *Corolla* alba, rubicundo-tincta (ex *Garrett*) ; tubus 7 mm. longus extra glaber ; lobi 1 mm. longi glabri. *Stamina* 6 mm. longa, filamentis 2·75 mm. longis pilosis ; antherae aristatae vel exaristatae. *Stylus* 7·5 mm. longus glaber.

Watershed between the Mê Lao-Chiengrai district and the Mê Kuang-Chiengmai district, c. 1550 m., *Garrett* 744 (type). Chiengmai, Doi Sutep, *Mrs. D. J. Collins* 1207, 1207A, 1207B. Lampang, Mê Sai Kam, c. 600 m., *Winit* 1591.

Diplycosia epiphytica *Fletcher* [Ericacae–Andromedeae] ; *D. pilosae* Blume affinis sed nervis duabus primariis ad costam approximatis differt.

Frutex epiphyticus (ex *Kerr*) ; ramuli teretes, primo hispidi mox glabri, grisei vel griseo-brunnei. *Folia* ovata, apice longius acuminata, basi cuneata vel subrotundata, subtus brunnea et parum lucida, utrinque hispida mox glabra, nervis supra impressis, costa subtus prominente, nervis lateralibus duobus subtus prominentibus, margine recurva integra vel sparse serrulata, petiolo 5–7 mm. longo primo hispido mox glabro suffulta. *Flores* circ. 3, in fasciculis dispositi ; pedicelli 5–7 mm. longi hispidi ; bracteae ovatae, 1 mm. longae, 0·75 mm. latae, ciliatae. *Calyx* glaber, tubus 1·2 mm. longus ; limbus 5-lobatus, lobis 2 mm. longis 2–2·5 mm. latis sparse ciliatis apice acutis. *Corolla* punicea (ex *Kerr*) glabra ; tubus 4 mm. longus ; limbus 5-lobatus, lobis 2 mm. longis 2 mm. latis apice obtusis. *Stamina* 10, filamentis 3 mm. longis ; antherae 2·5 mm. longae. *Ovarium* globosum 2 mm. diametro ; stylus 3 mm. longus.

Surat, Kao Nawng, c. 1100–1200 m., evergreen forest, *Kerr* 13272.

Xolisma foliosa *Fletcher* [Ericaceae–Andromedeae] ; *X. comptae* (W. W. Sm. et J. F. Jeff.) Rehd. affinis sed nervis infra plus minusve obscuris non elevatis, racemis foliosioribus differt.

Frutex circa 0·75 m. altus (ex *Kerr*), ramulis teretibus brunneis primo minute pubescentibus cito glabrescentibus. *Folia* elliptica vel oblongo-elliptica, 2–4 cm. longa, 1–2 cm. lata, apice obtusa basi rotundata vel subrotundata, coriacea, supra griseo-viridia, glabra, costa inconspicua, nervis impressis, infra griseo-brunnea, glabra vel subglabra, costa prominente, nervis lateralibus 4–5-paribus subprominulis, nervis transversis nervulisque saepe obscuris ;

petiolus 2–4 mm. longus pilosus vel subglaber. *Racemi* foliosi 4–8 cm. longi pilosi ; pedicelli 5 mm. longi, arcuati pilosi, basi bracteolis binis subulatis 2 mm. longis ornati. *Calycis* lobi sparse pilosi, lanceolati vel ovato-lanceolati, 3 mm. longi, ad basim 1·5 mm. lati, coriacei. *Corolla* alba (ex *Kerr*) 8–10 mm. longa, extra ± dense et adpresse pilosula, lobis brevibus triangularibus 1 mm. longis 1·75 mm. latis. *Stamina* 10 inclusa ; filamenta corollae basi adfixa, complanata, pilosa, medio geniculatim flexa, apice conspicue biaristata. *Ovarium* 1–1·5 mm. diametro, glabrum.

Lôi, Kao Krading, c. 1200 m., abundant in open grassy plateau, *Kerr* 8673.

Lysimachia Garrettii *Fletcher* [Primulaceae–Lysimachieae] ; *L. lancifoliae* Craib affinis, sed calycibus fructibusque majoribus, foliis parum latioribus differt.

Caules erecti, circa 20–35 cm. alti, sulcati, juventute glandulis breviter stipitatis densius tecti, glandulis mox deciduis. *Folia* alterna, elliptica vel lanceolata, apice in apiculum gradatim angustata, basi attenuata in petiolum decurrentia, 3–5 cm. longa, 1–2 cm. lata, chartacea, supra viridia, subtus pallidiora, utrinque glabra, nervis lateralibus 4–5-paribus supra saepe parum impressis, subtus cum costa prominentibus, nervulis paucis subtus subprominulis, margine anguste revoluta, glabra ; petioli circa 1 cm. longi, supra canaliculati, ut caules glandulosi. *Flores* axillares, solitarii ; pedicelli 2–3 cm. longi, graciles, apicem versus incrassati, sparse glandulosi. *Calyx* 5-partitus, segmentis ovato-lanceolatis caudatis, 5 mm. longis 1·5 mm. latis dorso sparse glandulosis. *Corolla* flava (ex *Garrett*) 5-partitus, segmentis ellipticis vel oblongis 10–12 mm. longis, 5 mm. latis apice rotundatis. *Stamina* 5, filamenta 1 mm. longa ; antherae 7 mm. longae. *Ovarium* 1·5 mm. altum ; stylus 7 mm. longus. *Capsula* 5-valvis, 5–7 mm. longa ; semina fusca angulata.

Doi Angka, east spur ending in Doi Pa Mawn, c. 1630–1710 m., *Garrett* 403.

Lysimachia oppositifolia *Fletcher* [Primulaceae-Lysimachieae] ; *L. cordifoliae* Hand.-Mzt. affinis sed foliis non cordatis, calycis lobis maioribus, pedicellis validioribus differt.

Frutex scandens (ex *Kerr*) ; ramuli quadrangulares saepe parce alati, glabri, flavo-virides. *Folia* opposita, ovata, apice acuta, basi cuneata vel subrotundata, 3–6 cm. longa, 1·5–3·5 cm. lata, chartacea, utrinque glabra, subtus sparse glandulosa, supra viridia, subtus pallidiora, nervis lateralibus 3–4-paribus, subtus cum costa prominulis, nervulis paucis, margine minute ciliata ; petioli (lamina saepe decurrente) 0.·5–1 cm. longi, supra canaliculati sparse glandulosi. *Flores* axillares, solitarii ; pedicelli 2–2·5 cm. longi, graciles, apicem versus incrassati. *Calyx* 5-partitus, segmentis lanceolatis 8 mm. longis 2 mm. latis glabris. *Corolla* flava (ex *Kerr*) 5-partitus, segmentis ellipticis 8 mm. longis 4·5 mm. latis apice rotundatis ;

tubus 3 mm. longus. *Stamina* 5, filamenta 0·75 mm. longa ; antherae 2·5 mm. longae. *Ovarium* globosum 1·5 mm. diametro ; stylus 5 mm. longus. *Capsula* 5-valvis, 5–6 mm. longa ; semina fusca angulata.

Doi Chiengdao, c. 1800 m., trailing over ground in scrub jungle, *Kerr* 6569.

Lysimachia pilosa *Fletcher* [Primulaceae–Lysimachieae] ; *L. Wilsoni* Hemsl. affinis sed pilosa nec glabra, insuper pedunculis longioribus, floribus corymbosim nec racemosim dispositis differt.

Herba circa 20–30 cm. alta, ramosa, caulibus hirsuto-puberulis. *Folia* alterna, ovata vel elliptica, apice acuta vel apiculata, basi in petiolum cuneatim attenuata, 4–10 cm. longa, 2–6 cm. lata, membranacea, utrinque griseo-brunnea, pilosa et sparse glandulosa, venis vix conspicuis, nervis lateralibus 4–5-paribus, margine integra ciliata ; petioli 1–2·5 cm. longi. *Flores* pauci, 2–8, in corymbos terminales ramis parvis lateralibus suffultos dispositi ; pedunculi 4–10 cm. longi pilosi ; pedicelli 5–10 mm. longi ; bracteae lanceolatae circa 5 mm. longae, ciliatae. *Calyx* usque ad basim 5-partitus, segmentis ovatis vel ovato-lanceolatis 5 mm. longis 2–2·5 mm. latis pilosis. *Corolla* flava (ex *Kerr*), glabra ; tubus 3 mm. longus ; limbus 5-partitus, segmentis ovatis vel ellipticis 4·5–5 mm. longis 4 mm. latis apice rotundatis. *Stamina* corolla minora ; filamenta 2 mm. longa ; antherae 2 mm. longae. *Ovarium* globosum 1 mm. diametro ; stylus staminibus vix aequilongus.

Doi Angka, c. 1500 m., in evergreen forest, *Kerr* 6341.

Maesa crenata *Fletcher* [Myrsinaceae–Maeseae] ; *M. indicae* A.DC. affinis sed lineolis nervilliformibus destituta ; nec non *M. montanae* A.DC. affinis sed foliis maioribus latioribusque differt.

Frutex scandens circa 2 m. altus (ex *Kerr*) ; ramuli teretes, glabri vel puberuli, brunnei, lenticellis numerosis elevatis praediti. *Folia* elliptica vel oblongo-elliptica, apice acuta, basi rotundata vel subcordata, 20–25 cm. longa, 8–12 cm. lata, chartacea, viridia vel griseo-brunnea, subtus pallidiora, utrinque glabra, nervis supra conspicuis, costa subtus prominente, nervis lateralibus 8–10-paribus, nervis transversis paucis irregularibus saepe inconspicuis, lineolis nervilliformibus destituta, margine crenata, petiolo circa 2 cm. longo supra canaliculato puberulo suffulta. *Racemi* axillares, 1–3·5 cm. longi puberuli ; bracteae lanceolatae 1·5 mm. longae ciliatae ; pedicelli 1–2 mm. longi apice bracteolis binis ovatis vel ovato-lanceolatis 0.·5 mm. longis ornati. *Calyx* extra puberulus, 5-partitus, segmentis ovatis 1·5 mm. longis 1·5 mm. latis apice rotundatis ciliatis. *Corolla* alba (ex *Kerr*), glabra, in toto 2 mm. longa. *Stamina* 1 mm. longa. *Ovarium* 1 mm. diametro.

Ranawng, Lam Lieng, c. 10 m., evergreen forest, *Kerr* 16424.

This plant, obviously closely allied to *M. indica* A.DC. and *M. montana* A.DC., differs mainly in the points noted above. The

inflorescence in this genus is not a safe character on which to rely, varying greatly in length in the same species. Herbarium sheets of *M. indica* show the inflorescence up to 10 cm. or more long. Even so, Kerr's plant would seem to differ from both *M. indica* and *M. montana* in having constantly a shorter inflorescence.

Maesa lineolata *Fletcher* [Myrsinaceae–Maeseae]; *M. indicae* A.DC. affinis sed infructescentiis minoribus differt; nec non *M. sublanceolatae* Fletcher affinis sed lineolis nervilliformibus manifestioribus differt.

Frutex scandens circa 2 m. altus (ex *Kerr*); ramuli teretes vel obtuse quadrangulares, primo sparse puberuli mox glabri, griseo-brunnei. *Folia* elliptica, apice acute attenuata, basi cuneata, 5–15 cm. longa, 3–6 cm. lata, griseo-viridia subtus saepe pallidiora, chartacea, utrinque glabra, lineolis nervilliformibus manifestis praedita, nervis supra conspicuis, costa subtus prominente, nervis lateralibus 6–8-paribus subtus prominulis parallelis, nervulis obscuris, margine dentata, petiolo circa 2 cm. longo supra canaliculato glabro suffulta. *Flores* non visi. *Infructescentia* axillaris circa 5 mm. longa glabra. *Fructus* albus (ex *Kerr*), ellipticus 5–7 mm. longus 3–5 mm. diametro. *Semina* minuta, nigra, rugosa.

Kanburi, Wangka, circa 200 m., by stream in bamboo forest, *Kerr* 10496.

A species clearly distinguished from all others by the very short infructescence and the conspicuous black lines on the leaves.

Maesa paniculata *A.DC.* var. **pauciflora** *Fletcher* [Myrsinaceae-Maeseae]; a typo inflorescentia minore non-ramoso differt.

Pattani, Betong, c. 300 m., scrambling shrub c. 2·5 m. high, flowers white, evergreen forest, *Kerr* 7654.

Maesa sublanceolata *Fletcher* [Myrsinaceae–Maeseae]; *M. indicae* A.DC. affinis sed foliis sublanceolatis nec ellipticis, margine inaequaliter nec aequabiliter crenata differt.

Frutex scandens circa 1·5 m. altus (ex *Kerr*); ramuli teretes, glabri vel sparse puberuli, brunnei, lenticellis numerosis conspicue elevatis praediti. *Folia* sublanceolata vel lanceolata, apice acuta, basi rotundata, 17–25 cm. longa, 4–8 cm. lata, chartacea, supra viridi-grisea vel griseo-brunnea, subtus pallidiora, utrinque glabra, lineolis nervilliformibus manifestis praedita, nervis supra vix conspicuis, costa subtus prominente, nervis lateralibus 5–7-paribus subtus prominulis parallelis, nervulis obscuris, margine leviter inaequaliter crenata, petiolo circa 1 cm. longo supra canaliculato glabro suffulta. *Inflorescentiae* paniculatae vel rarius racemosae, 2–4 cm. longae, puberulae; bracteae lanceolatae circa 1 mm. longae ciliatae; pedicelli 1·5 mm. longi apice bracteolis binis minutis ornati. *Calyx* extra puberulus 5-partitus, segmentis deltoideis 1 mm. longis 1 mm. latis ciliatis. *Corolla* alba (ex *Kerr*), in toto 2 mm. longa. *Stamina* circa 1 mm. longa. *Ovarium* 1 mm. diametro.

Chumpawn. Ta Ngaw, c. 50 m., evergreen forest, *Kerr* 11476 (type). Ranawng, Pakchan, under 50 m., scrub, *Kerr* 11690. Songkla, Ban Wangsai, c. 50 m., evergreen forest by stream, *Kerr* 15863.

It may be that here there is a mixture. The Ranawng plant differs in having the dark lines on the leaves more easily seen and in the leaves drying more green in colour. In the Chumpawn plant the lines can sometimes be seen especially in the young leaves. The only material to hand of the Ranawng plant is one small twig and under the circumstances the writer does not feel justified in separating the two plants. Similarly the Songkla plant is represented by a twig only, the leaves of which are more elliptic than in the other two collections. But until further material be available this plant should not be separated.

Rapanea subpedicellata *Fletcher* [Myrsinaceae–Eumyrsineae] ; *R. umbellulatae* (Wall.) Mez affinis sed pedicellis brevioribus, calycis lobis parum maioribus differt.

Arbor parva circa 3 m. alta (ex *Kerr*) ; ramuli teretes, crassiusculi, sparse puberuli mox glabri, brunnei vel griseo-brunnei, lenticellis numerosis parvis elevatis praediti. *Folia* elliptica vel oblongo-elliptica, apice rotundata, basi longe cuneata, 5–9 cm. longa, 2–3 cm. lata, coriacea, supra brunnea viridi-tincta nitidaque, subtus brunnea vel griseo-brunnea, utrinque glabra, costa subtus prominente, nervis lateralibus numerosis parallelis inconspicuis, subtus punctulis crebris aterrimis conspersa, margine integra recurva, petiolo 5–8 mm. longo, canaliculato glabro vel sparse piloso suffulta. *Inflorescentiae* e ramulis breviter verruculiformibus formatae 3–7-florae, umbelliformes, pedicellis ad 1 mm. longis glabris. *Sepala* basi coalita, ovata vel ovato-triangularia, circa 1 mm. longa, 1 mm. lata, apice rotundata, glanduloso-punctata, ciliata. *Drupae* purpureae (ex *Kerr*), pyriformes, circa 3–4 mm. longae, 3–4 mm. diametro.

Ranawng, Kao Pawta Luang Kêo, c. 1300 m., open evergreen forest, *Kerr* 16968.

Embelia calcarea *Fletcher* [Myrsinaceae–Eumyrsineae] ; *E. grandifoliae* Fletcher affinis sed foliis angustioribus basi attenuatioribus, axe inflorescentiae crassiore differt.

Frutex scandens (ex *Henderson*) ; ramuli crassi, verrucosi, glabri, brunnei vel griseo-brunnei, lenticellis numerosis conspicue elevatis praediti. *Folia* obovata, apice obtusa, basi longe acuminata, 9–18 cm. longa, 5–7 cm. lata, subcoriacea, utrinque brunnea nitida glabraque, nervis supra conspicuis costa subtus prominente, nervis lateralibus subtus prominulis numerosis parallelis intra marginem arcuatis, subtus punctulis atris breviter lineoliformibus praedita, margine integra, petiolo 1·5–2 cm. longo supra canaliculato glabro suffulta. *Inflorescentiae* laterales simplices spiciformes, axe crasso verrucoso glabro. *Flores* 4-meri. *Calycis* lobi ovati obtusi, in

fructu circa 2 mm. longi, 1·5 mm. lati, ciliati. *Fructus* globosus, circa 12 mm. diametro. *Semen* subglobosum 8 mm. diametro.

Langkawi, Selat Panchor, c. 15 m., climbing on limestone, *Henderson* 29086.

Embelia disticha *Fletcher* [Myrsinaceae–Eumyrsineae]; *E. pulchellae* Mez affinis sed foliis cordatis, floribus sessilibus vel subsessilibus minoribus punctatis differt.

Frutex scandens (ex *Kerr*); ramuli graciles, teretes, pilis patentibus dense obtecti, lenticellis numerosis conspicue elevatis praediti. *Folia* optime distiche ordinata, ovata, apice rotundata, basi cordata vel subcordata, 1–2·5 cm. longa, 0·75–1 cm. lata, chartacea vel subcoriacea, utrinque brunnea, costa utrinque glabra supra conspicua subtus prominente, nervis lateralibus numerosis inconspicuis parallelis, subtus perregulariter punctulis minutis immersis permultis praedita, margine integra, petiolo 1 mm. longo piloso suffulta. *Inflorescentiae* pauciflorae, subumbellatae, dense ferrugineo-glandulosae, 2–5 mm. longae. *Flores* sessiles vel subsessiles, 4–5 meri. *Sepala* basi breviter coalita, lobis lanceolatis obtusis circa 1 mm. longis punctatis dorso margineque longe pilosis. *Corolla* 2·5 mm. longa; segmenta ovata apice rotundata, circa 1·5 mm. longa, 1–1·5 mm. lata, sparse punctata, extra pilosa ciliata, intra papillosa. *Stamina* 1·5 mm. longa; antherae dorso punctatae. *Ovarium* floris ♂ reductum.

Nan, Doi Pu Ka, c. 1700 m., evergreen forest, *Kerr* 4922.

Embelia grandifolia *Fletcher* [Myrsinaceae–Eumyrsineae]; *E. subcoriaceae* (C. B. Clarke) Mez affinis sed floribus sessilibus differt.

Frutex scandens; ramuli teretes vel obtuse quadrangulares, glabri, brunnei, lenticellis paucis elevatis praediti. *Folia* obovata vel late elliptica, apice breviter acuminata, basi longe cuneata, 10–20 cm. longa, 6–12 cm. lata, coriacea, supra brunnea nitidaque, subtus pallidiora, utrinque glabra, nervis supra conspicuis, costa subtus prominente, nervis lateralibus utrinque numerosis parallelis intra marginem arcuatis, petiolo circa 2·5 cm. longo supra canaliculato glabro suffulta. *Inflorescentiae* omnes laterales in ligno bienni e squamulis imbricatis provenientes, simplices, spiciformes, 2–4 cm. longae, glabrae; bracteae lanceolatae, coriaceae, circa 1·5 mm. longae, acutae. *Calyx* fere ad basim 4-partitus, circa 1·75 mm. longus, segmentis ovatis 1 mm. latis ciliatis punctatis. *Corollae* segmenta 4, elliptica vel oblonga, apice rotundata, 3 mm. longa, 1·75 mm. lata, intra puberula, ciliata, valde punctata. *Stamina* corolla longiora; filamenta 3·5 mm. longa; antherae circa 1·5 mm. longae dorso punctatae. *Ovarium* floris ♂ reductum.

Chantabun, Kao Sabap, c. 100 m., evergreen forest, *Kerr* 18032.

In his monograph Mex has the flowers of *E. subcoriacea* 5-merous. This is an error as the flowers of Clarke's plant are 4-merous.

Embelia impressa *Fletcher* [Myrsinaceae–Eumyrsineae] ; *E. sootepensi* Craib affinis sed foliis oblongis coriaceis paene integris basi rotundatis, racemis brevioribus differt.

Frutex scandens (ex *Kerr*) ; ramuli obtuse quadrangulares, primo valde pilosi mox fere glabri, brunnei, lenticellis paucis praediti. *Folia* oblonga vel oblongo-elliptica, apice late obtusa, basi rotundata vel subcuneata, 5–11 cm. longa, 2–4 cm. lata, chartacea vel coriacea, supra suffusco-brunnea subtus pallidiora, utrinque glabra vel subtus ad costam sparse puberula, nervis supra impressis subtus prominentibus, nervis lateralibus 12–14-paribus parallelis intra marginem arcuatis, margine sparse serrulata vel integra, petiolo circa 5–7 mm. longo supra canaliculato irregulariter alato cinereo-puberulo suffulta. *Inflorescentiae* racemosae 0·5–2 cm. longae furfuraceae ; pedicelli circa 1·5 mm. longi ; bracteae minutae ovatae furfuraceae. *Sepala* basi coalita, ovata obtusa, 0·5 mm. longa, 0·75 mm. lata, pauci-punctata. *Corollae* segmenta oblonga vel elliptica, apice rotundata, 2 mm. longa, 1·25–1·5 mm. lata, extra glabra, intra sparse papillosa, punctata. *Stamina* circa 2 mm. longa, antheris 0·75 mm. longis dorso-punctatis.

Chiengmai, Doi Sutep, c. 1250 m., evergreen forest, *Kerr* 3509 (type). Doi Ka, c. 1340 m., evergreen forest, *Winit* 1365.

E. impressa *Fletcher* var. **serrata** *Fletcher* [Myrsinaceae–Eumyrsineae] ; a planta typica foliis serratis, racemis pedicellisque longioribus, bracteis maioribus differt.

Chiengmai, Doi Sutep, c. 1500 m., evergreen forest, *Kerr* 3505.

This plant, differing from the type mainly in the points noted above, is also much more strongly lenticellate. When more fully represented it may have to be accorded specific rank.

Embelia Kerrii *Fletcher* [Myrsinaceae–Eumyrsineae] ; *E. nutanti* Wall. affinis, foliis integris minoribus acuminatis, lenticellis numerosioribus, racemis longioribus, petalis valde punctatis differt.

Frutex scandens ; ramuli teretes vel obtuse quadrangulares, juventute pilosi, mox fere glabri, brunnei, lenticellis numerosis et conspicue elevatis praediti. *Folia* elliptica vel oblongo-elliptica, apice obtusa, basi cuneata vel subrotundata, 3–10 cm. longa, 2–3 cm. lata, chartacea, utrinque brunnea vel griseo-brunnea, supra glabra, subtus costa sparse puberula, supra costa impressa subtus prominente, nervis lateralibus 8–12-paribus intra marginem arcuatis subtus prominulis, margine integra, petiolo 5–7 mm. longo supra canaliculato cinereo-puberulo irregulariter alato suffulta. *Inflorescentiae* paniculatae vel racemosae, ad 4 cm. longae, pedicelli 2–3 mm. longi, ut rhachis glanduloso-furfuracei ; bracteae filiformes circiter 1 mm. longae, furfuraceae. *Sepala* basi breviter coalita, ovata, acuta, 1 mm. longa, 1 mm. lata, dorso glanduloso-

puberula, ciliata, pauci-punctata. *Corollae* segmenta oblonga, apice rotundata, circa 3·5 mm. longa, 2 mm. lata, extra glabra vel puberula, ciliata, intra papillosa, manifestius punctata. *Stamina* circa 2 mm. longa, antheris 1 mm. longis dorso punctatis. *Ovarium* floris ♂ reductum.

Korat, Kao Lêm, c. 1000 m., evergreen forest, *Kerr* 9929, 9929A, *Put* 3533 (type).

VI—ACHYROSPERMUM IN TROPICAL AFRICA.

E. A. Bruce.

The genus *Achyrospermum* ("chaffy seed," referring to the membranous scales at the apex of the nucules) was founded by Blume (1) in 1826, on two species, *A. densiflorum* and *A. phlomoides*, both from Java. In 1836 and 1848 Bentham tentatively added two other species, *A. fruticosum*(2) (Mascarenes) and *A. philippinense*(3) (Philippines), and also included under the generic synonymy *Siphotoxis* and *Lamprostachys* Boj. mss. Subsequently Bentham and Hooker f.(4) amplified Blume's description to accommodate two additional species and extended the geography to the Seychelles and Angola. They placed the genus in the subtribe *Lamieae* of *Stachydeae*. Hooker f.(5) in 1885 transferred *Teucrium Wallichianum* Benth. to *Achyrospermum*, thus further extending the geographical range to include India. Baker(6) in 1900 described three new and recognized in all eight distinct species from Tropical Africa.

After this little was added until 1921, when Miss Janet Perkins (7) published a paper on "The African Species of Achyrospermum.' Miss Perkins revised the concept of a number of the species in the "Flora of Tropical Africa" and published several new ones. In addition to this she determined the true position of *Elsholtzia Schimperi* Hochst., and transferred this species from *Elsholtzia* Willd. to *Achyrospermum* Blume. *Elsholtzia Schimperi* Hochst. was founded on a specimen collected by Schimper (no. 1411) in Abyssinia in 1842. This remained a *nomen nudum* until 1894, when a description was published by J. Briquet(8). Baker(9) retained the species in *Elsholtzia* and also published under *Achyrospermum*, in the same work, three new species of the "Schimperi Type":—*A. cryptanthum* Bak., *A. nyasanum* Bak. and *A. africanum* Hk. f. ex Bak. Miss Perkins reduced these and *A. aethiopicum*

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(1) Blume, Bijdr. 840 (1826). (2) Benth. Lab. 643 (1836). (3) DC. Prod. **12**, 458 (1848). (4) Benth. & Hk. f. Gen. Plant. **2**, 1208 (1876). (5) Hook. f. Fl. Brit. India **4**, **2**; 673 (1885). (6) Baker in Dyer, Fl. Trop. Afr. **5**, 463 (1900). (7) Perkins in Notizbl. Bot. Gart. Berlin, **8**, 78 (1921). (8) Briq. in Bull. Herb. Boiss. **2**, 133 (1894). (9) Bak. in Dyer, Fl. Trop. Afr. **5**, 451 (1900).

Welw. to synonyms of *A. Schimperi* Perk. I cannot agree with this concept of *A. Schimperi* and have found it necessary, in revising the African material, to revive some of these names, and in addition to make two new species and one new combination.

Seventeen species are here recognized from Africa :—six from West Africa (French Guinea—Cameroons), four from East Africa ([10]) (Abyssinia, Kenya, Uganda and Tanganyika), one from the Belgian Congo and two from South Tropical Africa (Angola, Rhodesia and Nyasaland). In addition to these one species is common to the Cameroons and Congo, one to the Congo and N. Rhodesia, one to the Congo and East Africa, and two to East and South Tropical Africa (see fig. 2). The complete geographical range is from French Guinea across to Abyssinia in the East, then south to Rhodesia, through the Mascarenes to N.E. India, Malaya and the Philippines (see fig. 1).

The genus *Achyrospermum* is shade-loving and is usually found among dense vegetation in the undergrowth of rain-forests, or in moist places on river banks. It varies in habit from perennial herbs to straggling shrubs, but is always characterized by its dense spiciform inflorescences. These may be either terminal and axillary, or only axillary. The former is typical of the herbaceous perennial, whilst the latter is to be found among some of the shrubby forms, where the inflorescence is often borne on the woody branches remote from the leaves, as in *A. Carvalhi* (see fig. 3).

The genus is most closely related to *Colquhounia* from S.E. Asia, the connecting link being through *A. fruticosum*, a Mascarene

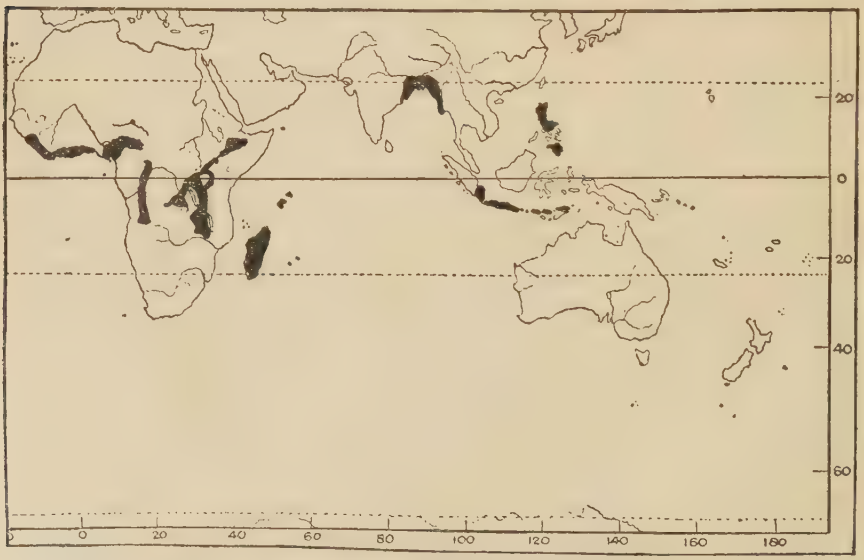

Fig. 1. Geographical range of *Achyrospermum*.

([10]) The whole of Ruwenzori has been included in East Africa for convenience.

Fig. 2. Distribution of *Achyrospermum* in Tropical Africa. (The lower figure **6** should be within the Belgian Congo).

species, which has the large exserted, incurved corolla of *Colquhounia*. Both genera have appendages at the apex of the nucules.

Several species of the genus *Achyrospermum* are very closely related, and it is difficult, in some cases, to decide on the separating line, and to obtain definite key characters. Vegetative characters are chiefly used in the key as there seems to be little range in floral structure within the genus, except in the size of the lower lip of the corolla. The dentation and indumentum of the leaf, and the size, shape, indumentum and persistence of the bracts have been found to be useful and fairly constant specific characters.

In addition to the material in the Kew Herbarium, specimens have been examined at the British Museum (Natural History), and a number of specimens have been received on loan from Berlin. I am indebted to the Directors of these institutions for the facilities afforded.

Key to Species.

Inflorescences lateral, usually borne on the one-year-old shoots :
- Leaf-base not decurrent on the petiole ; leaves obscurely crenate, shortly petiolate (up to 1·5 cm.), narrowly elliptic, glabrous above, nerves conspicuous below, adpressed-pubescent ; inflorescences about 2 cm. long ; corolla subequal to the calyx ; stem tomentose .....**1. Schlechteri**
- Leaf-base cuneate-decurrent on the petiole ; leaves distinctly toothed :
  - Indumentum of nerves on lower surface of leaves short and adpressed, or ascending–crisped pubescent :
    - Corolla long-exserted (1 cm. or more) from calyx ; inflorescences up to 4 cm. long ; calyx 5 mm. long, slightly pubescent, teeth deltoid (less than 1 mm. long) ; leaves elliptic to oblong-elliptic, closely crenate-serrate, 9–15 cm. long and 5–7 cm. broad.....**2. radicans**
    - Corolla subequal to or shortly exserted from the calyx ; inflorescences about 6 cm. long ; calyx 9 mm. long, teeth triangular (over 1 mm. long) ; leaves broadly elliptic, serrate, conspicuously glandular, 14–20 cm. long and 7–12 cm. broad.....**3. micranthum**
  - Indumentum of nerves on lower surface of leaf spreadingly pilose :
    - Inflorescence dense ; flowers sessile or subsessile, forming a compact oblong " spike " 3–5 cm. long, 2 cm. broad ; calyx not tapered to the base, densely pubescent ; corollas not seen.....**4. laterale**
    - Inflorescence loose, 3–7 cm. long, 2 cm. broad ; flowers with pedicels up to 5 mm. long ; calyx thinly pubescent, narrowed to the base ; corolla exserted by 1·5 cm.....**5. Carvalhi**

Inflorescences terminal or terminal and axillary, borne on the new season's shoots :

Calyx-teeth long-acuminate or caudate, 3 mm. long, densely long-ciliate ; tube adpressed-pubescent and glandular ; leaves elliptic to narrowly obovate, shortly petiolate, rounded or subacute at the base, never decurrent on the petiole, densely glandular below with short adpressed pubescence on the nerves .....**6. ciliatum**

Calyx-teeth neither long-acuminate nor caudate, generally deltoid or lanceolate :

Indumentum of nerves on lower surface of leaves adpressed or crispate or closely ascending-pubescent :

Leaves triangular-subacute at the apex, gradually narrowed to the base, not decurrent on the petiole, obscurely crenate, obovate-elliptic, 6–18 cm. long, 4–6 cm. broad ; petiole 1–2·5 cm. long ; inflorescences generally short and comparatively broad, 3–5·5 cm. long, 2 cm. broad ; calyx about 1 cm. long, lobes lanceolate, acute, 3 mm. long ; bracts broadly ovate, pubescent, early deciduous .....**7. oblongifolium**

Leaves acuminate, decurrent on the petiole at the base, conspicuously serrate or dentate, elliptic or ovate-elliptic ; petiole 2–7 cm. long ; inflorescences terminal and axillary, former 5–12 cm. long, 1·5 cm. broad :

Bracts large (7–9 mm. long, 5–7 mm. broad), conspicuous, ovate or ovate-orbicular, shortly cuspidate, enclosing the verticils :

Leaves large, coarsely serrate-dentate, conspicuously decurrent on the petiole ; bracts ovate, 8 mm. long, 6 mm. broad, thinly puberulous, abruptly acuminate .....**16. aethiopicum**

Leaves not coarsely serrate :

Bracts and calyx conspicuously purple-tinged, the former papery, thinly pubescent ; corolla definitely exserted from the calyx (by 6 mm.), rose-violet ; leaves small, elliptic or narrowly elliptic, 6–9 cm. long, 2–4 cm. broad, closely serrate ; Nigerian species .....**8. erythrobotrys**

Bracts and calyx not or only slightly purple-tinged :

Bracts softly and densely pubescent with very short hairs ; corolla scarcely exserted from the calyx (by 2 mm.) ; axillary inflorescences very numerous ; leaves comparatively large, 10–20 cm. long, 5–7 cm. broad, crenate-serrate ; Uganda species .....**9. axillare**

Bracts pubescent only on the margin with fairly long hairs ..... **13. Schimperi**

Bracts small (5 mm. long, 3·5 mm. broad), inconspicuous, ovate, gradually acuminate or long-cuspidate, not enclosing the verticils :

Bracts thinly adpressed-pubescent ; calyx-tube densely pubescent ; corolla white, subequal to calyx ; leaves large, elliptic or oblong-elliptic, 15–20 cm. long, 6–8 cm. broad, coarsely serrate-dentate ; axillary inflorescences many..... **10. serratum**

Bracts glabrous or nearly so, only ciliate on the margin ; calyx-tube thinly pubescent, glandular ; corolla pubescent, pink, shortly exserted (by 3 mm.) ; leaves comparatively small, ovate or elliptic, 7–10 cm. long, 3–7 cm. broad, serrate ; axillary inflorescences few ..... **11. parviflorum**

Indumentum of nerves on lower surface of leaf spreadingly pilose, not adpressed or closely ascending :

Corolla with a large lower lip spreading at right angles to the tube, about 5 mm. long ; calyx puberulous and glandular, about 8 mm. long ; bracts broadly ovate-orbicular, about 1 cm. long and broad, cuspidate, glandular, thinly strigulose at the apex, otherwise glabrous ; inflorescence 5–14 cm. long, 2–2·5 cm. broad ; leaves ovate, 4–9 cm. long, 3·5–5 cm. broad, pilose, crenate-serrate ..... **12. cryptanthum**

Corolla with a small lower lip not more than 3 mm. long :

Inflorescence dense (about 2 cm. broad), the axis invisible between the verticils ; bracts at least 6 mm. long ; leaves sharply serrate or crenate-serrate, generally averaging 10 cm. long and 6 cm. broad :

Bracts orbicular or oblate, as broad or broader than long :

Bracts glabrous, except the ciliate margin, about 6 mm. long, 7 mm. broad, cuspidate, very conspicuous ; calyx villous, about 8 mm. long, teeth 1·5 mm. long ; inflorescence compact, 4–9 cm. long, 2 cm. broad ; leaves ovate, 7–11 cm. long, 4–6 cm. broad... **13. Schimperi**

Bracts densely hirsute, about 6 mm. long and broad ; calyx small, 5 mm. long, densely pilose, teeth shortly dentate ; leaves large, 15 cm. long, 8 cm. broad, ovate, acuminate, narrowly decurrent, densely setose-pilose..... **14. Peulhorum**

Bracts ovate, longer than broad :

Leaves crenate-serrate, ovate, 6–8 cm. broad, 10–14 cm. long, setose-pilose ; bracts inconspicuous, early deciduous, about 8 mm. long, 5 mm. broad, pubescent ; axillary inflorescences few ; West African species..... **15. africanum**

Leaves coarsely serrate-dentate, elliptic, 15 cm. long, 8 cm. broad, glabrescent above ; bracts conspicuous, puberulous, 1 cm. long and 6 mm. broad, abruptly acuminate, imbricate ; axillary

inflorescences several; Angolan species.....
16. aethiopicum

Inflorescence lax, the axis visible between the verticils; bracts small, inconspicuous, ovate-orbicular, 3 mm. long and broad; calyx 4 mm. long; both densely pilose; leaves small, ovate, 5–7 cm. long, 3–4·5 cm. broad, obtusely crenate, densely setose-pilose, triangular-acute at the apex, cuneate at the base.....
17. dasytrichum

ENUMERATION

1. Achyrospermum Schlechteri *Gürke* in Schlechter, Westafr. Kautsch. Exped. 311 (1900) partim, nomen, et in Engl. Bot. Jahrb. **36,** 127 (1905); Perk. in Notizbl. Bot. Gart. Berlin, **8,** 82 (1921).

CAMEROONS MT. Near Muëa, 2600 ft., *Schlechter* 12850 (type).

2. A. radicans *Gürke* in Engl. Pfl. Ost.-Afr. **C,** 343 (1895); Baker in Dyer, Fl. Trop. Afr. **5,** 464 (1900); Perk. l.c. 78.

TANGANYIKA TERRITORY. Usambara; Lutindi, *Gürke* 3294 (type); Gonja, *Gürke* 4219; Nyasa Highlands; Kyimbila, about 5000 ft., *Stolz* 2034.

Var. **grandibracteatum** var. nov. a forma typica bracteis conspicuis 8 mm. longis 6 mm. latis ovatis acuminatis leviter pilosis, inflorescentiis brevibus differt.

TANGANYIKA TERRITORY. Mahenge, near Sali, about 3500 ft., shrub 9–12 ft. high, *H. J. Schlieben* 2259 (type).

3. A. micranthum *Perk.* in Mildbr. Wiss. Erg. Deutsch. Zent-Afr.-Exped. 1907–08, **2,** 552 (1913).

BELGIAN CONGO. Ruwenzori West; Butagu-Tal, 5600–6800 ft., *Mildbraed* 2700 (type).

4. A. laterale Baker in Dyer, Fl. Trop. Afr. **5,** 464 (1900); Perk. l.c. 79.

Descr. emend. Suffrutex subscandens, ramis pubescentibus apicem versus densioribus. *Folia* longe petiolata, petiolis 4–8 cm. longis pubescentibus; laminae membranaceae, ellipticae, basi sensim et anguste cuneatae in petiolos decurrentes, apice acuminatae, 12–15 cm. longae, 4–7 cm. latae, subtus pilis patulis leviter vestitae, supra perlaxe pilosae, margine crenato-serrato, nervis lateralibus utrinsecus circiter 8 ascendentibus. *Inflorescentiae* axillares, densae, sessiles, oblongae, 3–5 cm. longae, e ramis vetustioribus ortae, floribus breviter pedicellatis. *Bracteae* late ovatae, acuminatae, pubescentes, 5 mm. longae et latae, mox deciduae. *Calyx* subcylindricus, 5-dentatus (fructu 7 mm. longus), pubescens, apicem versus pilis longis vestitus, dentibus deltoideis 1 mm. longis. *Corolla* rubra vel purpurea (non visa). *Nuculae* apice paleis membranaceis comosae.

NYASALAND. Shiré Highlands; near Blantyre, on top of Wirandi, *Buchanan* 98 (type); N'Chisi Mt., rain forest, in thickets, flowers purplish, *Burtt Davy* 1294.

Fig. 3. *Achyrospermum Carvalhi* Gurke. A, young leafy shoot (×⅔); B, under-surface of leaf (×2); C, leafless flowering branch (×⅔); D, bract (×3); E, calyx (×3); F, corolla (×3); G, young nutlet (×12).

5. A. Carvalhi *Gürke* in Engl. Pfl. Ost.-Afr. C, 343 (1895) ; Baker l.c. 464 ; Perk. l.c. 78.

KENYA COLONY. S. Kenya forest, 6000–7000 ft., shrub 6–12 ft., corolla red, *Battiscombe* 694 ; S. W. Kenya, 7000 ft. in forest, not in dense shade, handsome shrub 4–5 ft., corolla bright-pink, *Battiscombe* 1168 ; Mt. Kenya, east slope, Rogati river, 6000–7000 ft., *A. B. Rendle* 592.

NYASALAND. Namasi, *Cameron* s.n.

PORTUGUESE EAST AFRICA. Gorungosa, *Carvalho* (type).

S. RHODESIA. Chirinda Forest, 3700–4000 ft., in forest undergrowth, large shrub with bright-red flowers, *Swynnerton* 78.

6. A. ciliatum *Gürke* in Engl. Bot. Jahrb. **36,** 128 (1905) ; Perk. l.c. 82. *A. Schlechteri* Gürke in Schlechter, Westafr. Kautsch.-Exped. 311 (1900) partim, nomen.

Descr. emend. Herba vel *suffrutex,* ramis pilosis. *Folia* petiolata, petiolis 1–3 cm. longis pilis adpressis puberulis et paucis patulis obtectis ; laminae membranaceae, obovatae vel ellipticae, basi late cuneatae vel rotundatae, apice acutae vel breviter acuminatae, 10–20 cm. longae, 5–9 cm. latae, subtus glandulosae, nervis leviter adpresse pubescentibus aliter glabrae, supra pilis paucis obtectae, margine nonnunquam obscure ciliato-crenato, nervis lateralibus utrinsecus circiter 7. *Inflorescentiae* terminales et axillares, interdum 6–7 cm. longae, pedunculatae, floribus subsessilibus. *Bracteae* ovatae, pubescentes, mox deciduae. *Calyx* subcylindricus, circiter 7 mm. longus, adpresse pubescens, haud nervosus, apice ciliatus, 5-dentatus, dentibus deltoideis caudatis 2–3 mm. longis. *Corolla* non visa.

CAMEROONS. Dja Fluss, *Schlechter* 12769 (type).

BELGIAN CONGO. Kimuenza, 17 Km. south of Leopoldville, in shady marginal forest, *Mildbraed* 3733.

7. A. oblongifolium *Baker* in Dyer, Fl. Trop. Afr. **5,** 464 (1900) ; Hutch. & Dalz. Fl. West Trop. Afr. **2,** 279 (1931) ; Perk. l.c. 79. *Ocimum Sassandrae* A. Chev. Expl. Bot. Afr. Occid. Franç. 512 (1920) *nomen. A. densiflorum* Perk. in Notizbl. Bot. Gart. Berlin, **8,** 82, non Blume.

Descr. emend. Herba perennis vel *suffrutex,* ramis erectis tomentosis. *Folia* petiolata, petiolis 1–2 cm. longis tomentosis ; laminae membranaceae, obovato-ellipticae, basi cuneatae, apice triangulari-subacutae, 6–18 cm. longae, usque ad 8 cm. latae, subtus nervis adpresse puberulis aliter glabrae, supra glabrescentes, margine superne obscure crenato, nervis lateralibus utrinsecus 7. *Inflorescentia* terminalis, oblonga, densa, subsessilis, 3–6 cm. longa, 2 cm. diametro, floribus subsessilibus. *Bracteae* late ovatae, pubescentes, mox deciduae. *Calyx* subcylindricus, 5-dentatus, circiter 10-nervus, pubescens, glanduloso-punctatus, tubo 6 cm. longo, dentibus subaequalibus late triangularibus 3 mm. longis ciliatis. *Corolla* flavo-alba, bilabiata, calyce subaequalis, tubo cylindrico

circiter 5 mm. longo, labio postico brevissime 2-fido rotundato, antico longiore 3-fido, lobis rotundatis medio majore.

French Guinea. Konianké country between Fassakoidou and Kesseridou, *Chevalier* 2081 ; Guerzé country, Boola Mts., on Mt. Ntongon 3150 ft., *Chevalier* 20926.

Sierra Leone. Kennema, *Thomas* 7572, 7629 ; Mamaha, *Thomas* 4578.

Ivory Coast. Middle Sassandra and Middle Cavally, in forest clearings, *Chevalier* 19244.

Fernando Po. *Barter* 1697 (type).

St. Thomas Island. Angolares, Praia grande, 300 ft., *Quintas* 69 ; 1025.

Cameroons. Bitye, Yaunde, small undershrub, flowers white, *Bates* 1060 ; 1436.

Portuguese Congo. Maiombe ; Rio Lufo, an annual herb $1\frac{1}{2}$ ft. high, flowers white, in thickets, *Gossweiler* 7916.

8. A. erythrobotrys *Perk.* in Notizbl. Bot. Gart. Berlin, **8**, 80 (1921).

S. Nigeria. Bambuttu Mts.; Markt Singwa, 6500–8000 ft., in grass savannah, 3–5 ft. high, flowers rose, *Ledermann* 1659 (type) ; in open mountain scrub 6500 ft., very common, *Ledermann* 1696.

9. A. axillare *E. A. Bruce*, sp. nov.; affinis *A. parvifloro* S. Moore, sed bracteis majoribus dense pubescentibus, inflorescentiis axillaribus numerosis differt.

Suffrutex circiter 1·3 m. altus, nonnunquam subscandens, ramis subteretibus striatis puberulis, internodiis 5–12 cm. longis, ramulis lateralibus plantae apicem versus brevibus basin versus longioribus inflorescentiis coronatis. *Folia* petiolata, petiolis 1–5 cm. longis canaliculatis ; laminae membranaceae, ellipticae vel oblongo-ellipticae, basi cuneatae in petiolos abrupte decurrentes, apice acutae, 9–20 cm. longae, 4–8 cm. latae, subtus nervis adpresse pubescentibus, supra pilis paucis vel glabrescentes, margine crenato vel crenato-serrato, nervis lateralibus utrinsecus 6–8 ascendentibus. *Inflorescentiae* plurimae, elongatae, spicatae, breviter pedunculatae, terminales et ramos laterales in axillis foliorum terminatae, 4–10 cm. longae, 1·5 cm. diametro. *Bracteae* conspicuae, imbricatae, ovato-orbiculatae, apice abrupte apiculatae, basi rotundatae, usque 9 mm. longae et latae, leviter nervosae, pubescentes, margine ciliato. *Calyx* subcylindricus, 5-dentatus, villosus, tubo 5 mm. longo, dentibus deltoideis acutis 2 mm. longis. *Corolla* alba, bilabiata, e calyce leviter exserta, tubo cylindrico 5 mm. longo leviter pubescente basin versus glabro, labio postico 1 mm. longo erecto bifido oblongo apice obtuso, labio antico 3-fido patente intermedio majore late orbiculare, omnibus extra pilosis. *Stamina* 4, exserta, arcuata.

Uganda. Luzira, near Kampala, *Liebenberg* 772 (type) ; Mawokota, 3900 ft., *Brown* 207 ; Entebbe, 3900 ft., *Brown* 352 ; Kigude, 4000 ft., on forest path 4 ft. high, flowers whitish, *Dümmer* 2671, 2671A.

Fig. 4. *Achyrospermum axillare* E. A. Bruce. A, flowering shoot (×⅔); B, under-surface of leaf (×¾); C, corolla (×3); D, bract (×3); E, style and ovary (×3); F, calyx (×3); G, nutlet (×6).

10. A. serratum *E. A. Bruce*, sp. nov.; affinis *A. aethiopico* Welw., sed bracteis minoribus inconspicuis differt.

Herba perennis, circiter 1 m. alta, ramis leviter pubescentibus demum glabrescentibus. *Folia* magna, longissime petiolata, petiolis 3–8 cm. longis sparse pubescentibus ; laminae membranaceae, anguste ellipticae vel ovato-ellipticae, basi cuneatae et in petiolos decurrentes, apice longe acuminatae, 14–18 cm. longae, 6–8 cm. latae, subtus glanduloso-punctatae, costis leviter adscendentibus pubescentibus aliter glabrae, supra costa media excepta glaberrimae, margine profunde dentato-serrato, nervis lateralibus utrinsecus circiter 6 adscendentibus arcuatis. *Inflorescentiae* terminales et axillares, anguste oblongae, densissimae ; terminalis sessilis, 6–9 cm. longa, 1·5 cm. diametro ; axillaris pedunculata, 1·5–5·0 cm. longa, floribus sessilibus. *Bracteae* mox deciduae, ovatae, acuminatae, pubescentes, 5 mm. longae, margine ciliato. *Calyx* subcylindricus, 5-dentatus, molliter pubescens et glanduloso-punctatus, tubo 4 mm. longo, dentibus subaequalibus triangulari-lanceolatis 2–3 mm. longis pilosis. *Corolla* alba, bilabiata, calyce subaequalis, tubo cylindrico 6 mm. longo apice hirsuto infra glabro, labio postico erecto bifido, labio antico longiore 3-fido intermedio majore, omnibus rotundatis. *Stamina* 4, leviter exserta, arcuata.

Belgian Congo. Elisabethville, about 4000 ft., *Rogers* 26251.

N. Rhodesia. Solwezi distr. ; R. Nyabisonga, among evergreen vegetation by the river in dense shade of trees and shrubs in ground full of humus, *Milne-Redhead* 799 (type).

11. A. parviflorum *S. Moore* in Journ. Bot. **45**, 97 (1907) ; Perk. l.c. 80. *A. Mildbraedii* Perk. in Wiss. Erg. Deutsch. Zent.-Afr. Exped. 1907–08, 553 (1913).

Belgian Congo. Fort Beni, Muera, flowers purple-rose, *Mildbraed* 2296.

Uganda. Budongo Forest, Unyoro, *Bagshawe* 927 (type) ; near Fort Portal, 4500 ft., *Bagshawe* 1264 ; 3600 ft., undergrowth in forest, 4 ft. high, flowers pink, *Eggeling* 1410 ; near Wantuluntu, 4000 ft., *Dümmer* 3043 ; Mabira Forest, Mulange, 4000 ft., forest-path, 3 ft. high, *Dümmer* 4498, 5603 ; near Mubango, 4000 ft., *Dümmer* 1385 ; Mabira, *Snowden* 230 ; *Maitland* 1282.

Kenya. N. Kavirondo, 5000 ft., climber in forest with spikes of white flowers, *Mrs. C. Jack* 148.

12. A. cryptanthum *Baker* in Kew Bull. 162 (1898), et in Dyer, Fl. Trop. Afr. **5**, 464 (1900). *A. nyasanum* Baker l.c. 456. *A. Schimperi* Perk. l.c. 79, pro parte. *A. swina* Perk. l.c. 80.

Tanganyika Territory. Iringa District ; East Mufindi, 6200 ft., a pink-flowered shrub up to 6 ft. high, more or less branched, in secondary *Myrica-Macaranga-Gymnosporia* mist forest, *Greenway* 3465 ; Kyimbila, *Stolz* 2106. Mts. E. of Lake Nyasa, *Rev. Johnson*.

Nyasaland. Masuka Plateau, 6500–7000 ft., *Whyte* s.n. (type).

13. A. Schimperi (*Hochst. ex Briq.*) *Perk.* in Notizbl. Bot. Gart. Berlin, **8**, 79 (1921), pro parte. *Elsholtzia Schimperi* Hochst. in Schimp. Pl. Abyss. Exsicc. Nr. 1411, nomen ; Vatke in Linnaea, **37**, 325 (1873) nomen ; Engl. in Hochgebirgsfl. Trop. Afr. 363 (1892) nomen ; Briq. in Bull. Herb. Boiss. **2**, 133 (1894) ; Gürke in Schlechter, Westafr. Kautsch. Exped. 311 (1900) ; Baker in Dyer, Fl. Trop. Afr. **5**, 451 (1900). *A. Mearnsii* Standley in Smithson. Misc. Coll. **68**, no. **5** ; 13 (1917).

Abyssinia. *Schimper* 694, 1411 (type) ; Addi-Aburi, 6500 ft., *Schimper* 755 ; between Harrar and Addis Ababa, *Wellby* s.n. ; between Djem-Djem and Wouramboulchi, 8500–9000 ft., *Omer Cooper* s.n.

Uganda. Ruwenzori ; Musandama, 7000 ft., on edge of forest, flowers lilac or blue, *Maitland* 1061 ; Bugishu, Bufumbo, 4000–5000 ft., 4–5 ft. high, flowers deep pink, *Chandler* 1000 ; Toro, *Fyffe* 71 ; Mt. Elgon, 6000 ft., near Namatala River, flowers purple, *Snowden* 534 ; Bulago, 6500 ft., suffruticose 2–3 ft., *Snowden* 1017 ; near Butarrhiga, 7000 ft., *Dümmer* 3690.

Kenya. Aberdare Mts., 7000 ft., *Mainwaring* s.n. ; near Nandi, *Whyte* s.n. ; Katamayu, 8000 ft., on river-bank at forest-edge, *Napier* 2715 ; Limoru, 7000 ft., *van Someren* 253 ; Limoru, riparian swamp, *Dümmer* 1624. Mt. Kenya, west slopes, in the giant heath zone, about 11800 ft., *Mearns* 1321 ; 1343.

14. A. Peulhorum (*A. Chev.*) *E. A. Bruce*, comb. nov. *Ocimum Peulhorum* A. Chev. in Expl. Bot. Afr. Occid. Franç. 512 (1920). *A. africanum* Hutch. & Dalz. Fl. West Trop. Afr. **2**, 279, pro parte.

Herba perennis, ramis lignosis hirsutis. *Folia* petiolis circiter 5 cm. longis hirsutis ; laminae ovatae, basi cuneatae et anguste decurrentes, apice acuminatae, circiter 15 cm. longae, 8 cm. latae, subtus dense patente supra leviter setoso-pilosae, nervis lateralibus utrinsecus 6. *Inflorescentiae* terminales et axillares, densae, 3–8 cm. longae. *Bracteae* dense hirsutae, circiter 6 mm. longae et latae. *Calyx* subcylindricus, 5 mm. longus, dense pilosus, dentibus breviter triangularibus. *Corolla* e calyce leviter exserta.

French Guinea. Between Dalaba and Mamow, *Chev.* 20347 (type).

15. A. africanum *Hook. f.* ex *Baker* in Dyer, Fl. Trop. Afr. **5**, 465 (1900) ; Hutch. & Dalz. Fl. West Trop. Afr. **2**, 279 (1931), pro parte. *A. Schimperi* Perk. l.c. 79, pro parte.

Cameroons Mt.: 2000 ft., *Mann* 1297 (type) ; 2500 ft., *Mann* 1949 ; Victoria, 3000 ft., *Kalbreyer* 99 ; Buea, 3000 ft., *Dunlap* 151.

Cameroons. Between Mafura and Mundame, 1000 ft., *Schlechter* 12914 ; Abonando, *Rudatis*.

16. A. aethiopicum *Welw.* in Trans. Linn. Soc. **27**, 56 (1869) ; Baker in Dyer, Fl. Trop. Afr. **5**, 465 (1900). *A. Schimperi* Perk. l.c. 79, pro parte.

Angola. Pungo Andongo, 2400–3800 ft., in shady forest at a cataract in the rocky Calundo valley, sporadic and rather rare, *Welwitsch* 1633 (type).

17. A. dasytrichum *Perk.* in Notizbl. Bot. Gart. Berlin, **8**, 81 (1921).

Cameroons. Jaunde Station, *Zenker* 322 (type).

VII—ADDITIONS TO THE WILD FAUNA AND FLORA OF THE ROYAL BOTANIC GARDENS. KEW: XVII.*

The following lists comprise records of species new to the Gardens and (in the list of birds) a few notes on species already recorded in this series. We are much indebted to the correspondents and members of the staff who have made these observations. The Director would be grateful for further records for incorporation in future lists.

The abbreviations of localities are as follows:—A=Arboretum, Q=Queen's Cottage Grounds, and R=Rock Garden.

The initials of the contributors, where known, follow each record. The following is a list of contributors.

Aikman, Mr. J.
Burtt, Mr. B. L.
Claiden, Mr. J.
Collenette, Mr. C. L.
Dallimore, Mr. W.
Ehrlich, Dr. J.
Hall, Miss K.
Hill, Sir. A. W.
Latham, Mr. A. H.
Mason, Mr. E. W.
Mingay, Mr. J. A.
Moon, Mr. A.
Ridley, Mr. H. N.
Robinson, Mr. C. J.
Turrill, Dr. W. B.
White, Dr. E. I.
Wiltshire, Mrs. V. G.

MAMMALS

***Meles meles** *L.* " Badger." One specimen lived in Q. 1912–1913. Early in 1913, owing to the damage it did to the ornamental wild fowl, it was dug up and set free in Essex. Judging by the size of its earth it must have lived there for some months. For a full account and photograph, see Journal of the Kew Guild, 1915, 217.

BIRDS

(In alphabetical order of English names)

Owing to increased building activities and consequent lack of suitable habitats in the neighbourhood, our wild birds have considerably decreased since Hudson wrote his account in 1906. Mr. Robinson has noted 61 different species during the last fourteen years, whereas Hudson's list contained 84 species. Nevertheless the

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* Continued from K.B. 1922, 193. See also K.B. 1934, 138.

following list records some fifteen birds not in Hudson's list ; these are marked with an asterisk. In addition there are notes on previously recorded species.

***Bittern.** *Botaurus stellaris* (L.) Found entangled in a bush in Q, Dec. 1921. Sent to the Zoo (A.W.H.).

Blackbird. *Turdus merula* L. (1) Variegated forms are common, some years more so than others. One with a white ring round its neck, resembling a ring-ouzel, was seen for some years in the *Rosaceae* collection ; others had white spots on shoulders and wings. A pure white one with a black feather or two in its tail and some black on the belly was seen in 1915 (H.N.R.). A pure white one, except for one grey feather in the tail is to be seen in Q. (J.C.).

Brambling. *Fringilla montifringilla* L. One pair, March 15, 1934. (A.M.)

Brown (or Tawny) Owl. *Stryx aluca* L. I have seen this owl in A. in the daytime, pursued by other birds ; and I have heard it hooting at 11 a.m. in Q. (H.N.R.).

***Buzzard.** *Buteo buteo* (L.). Seen flying over the Gardens, 1935 (H.N.R. & J.C.).

Chaffinch. *Fringilla coelebs* L. Hardly local, as Hudson states. It is all over the Gardens and flocks (chiefly females together) in winter in A. near the Nursery (H.N.R.).

Coal Tit. *Parus ater* L. C.J.R.†

***Cormorant.** *Phalacrocorax carbo* (L.). (1) Flying eastwards over the Gardens, about 300 ft. up, Aug. 30, 1935, and Sept. 1, 1935 (C.L.C.).

***Crossbill.** *Loxia curvirostra* L. One specimen seen in pines by the lake, Feb. 9, 1936 (E.I.W.). Later several others seen, one pair nesting.

Fieldfare. *Turdus pilaris* L. C.J.R.

Garden Warbler. *Sylvia borin* (Bodd.). C.J.R.

Golden-crested Wren. *Regulus regulus* (L.). C.J.R.

***Golden Oriole.** *Oriolus oriolus* (L.). (1) A male specimen seen on the wing, Aug. 21, 1934 (C.J.R.). (2) Sept., 1934, on two occasions (K.H. & J.C.).

† C.J.R. alone means that Mr. Robinson noticed the species between 1922 and 1936.

***Great Black-backed Gull.** *Larus marinus* L. Often seen on the river opposite Syon House. On the pond, winter 1935-36 (H.N.R.).

***Great Crested Grebe.** *Podiceps cristatus* L. This species was seen on the river opposite Syon House, Jan., 1931 (H.N.R.).

***Great Spotted Woodpecker.** *Dryobates major* (L.). (1) First seen March, 1924, near Pagoda. A pair have lived, and I think, bred, in Q. since 1930 (H.N.R.). (2) July, 1934 and April, 1935 (C.J.R.).

***Grey Wagtail.** *Motacilla cinerea* Tunst. (1) Gambolling on the edge of the lake, April, 1927 (C.J.R.). (2) Two specimens on waterlilies at west end of lake, Oct. 5, 1933 (H.N.R.).

Hawfinch. *Coccothraustes coccothraustes* (L.). (1) Five seen for several days feeding on *Ilex laevigata*, Oct., 1925 (H.N.R.). (2) C.J.R.

Large Hawk or Falcon. A large falcon has visited the Gardens almost every year since 1929. In autumn, when the wood pigeons are abundant, I have constantly found remains killed by it and one pellet containing a whole pigeons' leg. After vainly trying to locate it, in 1932 I saw a large falcon soaring in circles at a great height over Syon Vista, and in 1935 a pair circling over the Palace Lawn at 100 ft. They appeared to be Goshawks rather than Peregrine Falcons, being dark-grey or brown with white spotted tail feathers and blunt wings (H.N.R.).

House Sparrow. *Passer domesticus* (L.). A white specimen in Q., 1926–1935 (J.C.).

Kingfisher. *Alcedo ispida* L. Still frequent in the autumn by water in various parts of the Gardens (J.C.).

Lesser Spotted Woodpecker. *Dryobates minor* (L.). This species seems now to be rare. I have seen it, and Mr. Hankey saw one in September, 1934, near the Heath beds (H.N.R.). Weeping Ash by Herbarium, Dec. 28, 1934 (B.L.B.).

Long-Tailed Tit. *Aegithalos caudatus* (L.). C.J.R.

Magpie. *Pica pica* (L.). One specimen in the Iris Garden, March, 1929 (H.N.R.).

Marsh Titmouse. *Parus palustris* Stejn. (1) A regular inhabitant, commonly seen in winter and early spring. I believe it nests on the mound by the pond and in beech trees in A. (H.N.R.) (2) C.J.R.

Nuthatch. *Sitta europaea* Blyth. C.J.R.

***Peewit.** *Vanellus vanellus* (L.). (1) Frequently seen flying over from the Chiswick fields to Richmond (H.N.R.). (2) March, 1929 (C.J.R.).

Red-backed Shrike. *Lanius collurio* L. June, 1927 (C.J.R.).

***Redwing.** *Turdus musicus* L. (1) Comes in flocks almost every year when it is cold enough, e.g. winter 1933–1934. It feeds on Siberian crab, and has been seen catching insects by the lake and bathing in puddles (H.N.R.). (2) February, 1929, with fieldfares (C.J.R.). (2) February, 1936 (B.L.B.).

Robin. *Erythacus rubecula* (L.). Variegated forms : one with a snow-white cap near Queen's Cottage, 1925, and one with white stripes above and below the eyes and a white collar, near the Palm House, 1933 (H.N.R.).

***Sand Martin.** *Riparia riparia* (L.). (1) Seen flying over the pond with house martins, October 7, 1911 (K.B. 1911, 365). (2) Comes every year flying over the pond in spring and autumn. The first of the group to come and the last to go (H.N.R.).

Sandpiper (species not certain). C.J.R.

***Shag.** *Phalacrocorax aristotelis* (L.) Usually seen in the early morning by the side of the lake and in the daytime on the river between Isleworth Gate and Kew Bridge, 1931–36 (H.N.R. & J.C.).

Skylark. *Alauda arvensis* (L.). One specimen near the Wellingtonias, in heavy snow, Jan. 14, 1929 (H.N.R.).

***Snipe.** *Capella gallinago* (L.). (1) A specimen flying over Gardens from Syon House, June, 1927 (C.J.R.). (2) In April, 1934, one specimen was seen at the southern end of the Gardens (J.C.).

Sparrowhawk. *Accipiter nisus* (L.). (1) Specimen seen above the lake August 30, 1935 (C.L.C.). (2) Frequently seen (J.C. and H.N.R.).

Spotted Flycatcher. *Musicapa striata* (Pall.). Sometimes never seen for a whole season : sometimes abundant (i.e. about 12 years ago). Seen summer, 1935 (C.J.R.).

Swift. *Micropus apus* (L.). Seen on April 16, 1935 (C.J.R.).

***Tree Sparrow.** *Passer montanus* (L.). Two seen by the water tower some years ago (H.N.R. 1934).

***Wheatear.** *Oenanthe oenanthe* (L.). One female seen on passage near Palm House, 1933 (H.N.R.).

Willow Warbler or Wren. *Phylloscopus trochilus* (L.). C.J.R.

Wood Warbler or Wren. *Phylloscopus sibilatrix* (Bechst.). Still haunts the trees near the Heaths (H.N.R.).

Wryneck. *Iynx torquilla* L. (1) C.J.R. (2) Nested one year in hole in a beech tree in Q., but next year a starling occupied the hole and the wryneck did not re-appear (H.N.R.).

EXOTIC BIRDS

Indian Ring-necked Parrakeet. *Psittacula mamillensis.* Three of these birds settled in the Gardens in the autumn of 1929 and stayed all through the following summer. The species is native in India, Ceylon, Burma, and Cochin-China (J.C.).

Macaw. A specimen made its home in the Gardens from August to October, 1935 (J.C.).

INSECTS

Coleoptera

Phloeosinus thujae *Perris.* Thuja Bark Beetle. Found again on *Thuja orientalis* var. *intermedia* in Arboretum, Feb. 8, 1936 (W.D.). See K.B. 1922, 189.

Hymenoptera

Halictus minutus (*Schrank*). 1924 (H.N.R.).
Nomada goodeniana (*Kirby*). 1924 (H.N.R.).
Nomada marshamella (*Kirby*). 1924 (H.N.R.).

Diptera

SYRPHIDAE

Platychirus manicatus *Mg.* Sept. 1935 (H.A.L.).
Platychirus albimanus *Fab.* Sept. 1935 (H.A.L.).
Platychirus scutatus *Mg.* Sept. 1935 (H.A.L.).
Syrphus vitripennis *Mg.* Sept. 1935 (H.A.L.).
Syrphus luniger *Mg.* Sept. 1935 (H.A.L.).
Syrphus bulteatus *De G.* Sept. 1935 (H.A.L.).
Sphaerophoris scripta *L.* Sept. 1935 (H.A.L.).
Eristalis tenax *L.* Sept. 1935 (H.A.L.).
Eristalis nemorum *L.* Sept. 1935 (H.A.L.).
Zylota segnis *L.* Sept. 1935 (H.A.L.).

MUSCIDAE

Fannia hamata *Mg.* 1924 (H.N.R.).

CULICIDAE

Theobaldia annulata *Schrank.* 1908 (J.A.).

Lepidoptera

Colias croceus (*Fourcroy*). "Clouded Yellow." Sept., 1917 (H.N.R.).

Polyonia c-album (*Linn.*). "Comma." One specimen by Syon Vista and one on rose beds, Sept. 1934, and one hibernated specimen by Heath Beds, March, 1935 (H.N.R.).

Zygaena trifolii (*Esp.*). "Five-spotted Burnet." H. June 27, 1930 (H.N.R.).

ARACHNIDA

ARANEIDEA

Asagena alticeps *Keyserling.* Found in a parcel of orchids from Venezuela, Dec., 1927.

ANNELIDA

Eisenia veneta *Rosa*, var. **robusta** *Friend.* 1909 (See "Nature," Feb., 1927).

FLOWERING PLANTS

Veronica montana *L.* In grassfield near Herbarium, Aug. 20, 1922 (W.B.T.).

ALGAE

Chaetomorpha linum *Kütz.* Lake, Oct. 21, 1920 (J.A.M. Det. Prof. Fritsch).

FUNGI

Pyrenomycetes

Anthostoma dryophilum (*Curr.*) *Sacc.* On oak. Sept. 2, 1923 (E.W.M.).

Anthostoma turgidum (*Pers.*) *Nits.* On beech. Aug. & Sept. 1923 (E.W.M.).

Cryptovalsa protracta (*Pers.*) *Ces. & De Not.* On *Fraxinus* sp. July, 1934 (E.W.M.).

Diatrype disciformis (*Hoffm.*) *Fr.* On beech. Jan. & Sept., 1923 (E.W.M.).

Diatrypella favacea (*Fr.*) *Ces. & De Not.* On Birch Dec., 1922 & June, 1923 (E.W.M.).

Enchnoa infernalis (*Kunze*) *Fckl.* On oak. 1923 (E.W.M.).

Hypoxylon serpens (*Pers.* ex *Fr.*) *Fr.* On decaying bark of a dead elm branch. Oct. 18, 1934 (J.E.).

Quaternaria quaternata (*Pers.*) *Schroet.* On beech. Sept. 1922 & April–Sept. 1923 (E.W.M.).

MYCETOZOA

The following species new to the Gardens were recorded by Mrs. V. G. Wiltshire during 1925–26.

Physarum nutans *Pers.* On old stump.

P. compressum *Alb. & Schw.* On dead grass.

P. bitectum *Lister.* On fallen rhododendron leaves.

Craterium leucocephalum *Ditm.* On dead holly leaves.

Diderma spumaroides *Fries.* On dead lime leaves.

Stemonitis ferruginea *Ehrenb.* On rotten stump.

Comatricha typhoides *Rost.* On rotten wood.

C. pulchella *Rost.* On leaves and dead grass.

Dictydiaethalium plumbeum *Rost.* On dead twig.

Trichia affinis *de Bary.* On rotten wood.

Lachnobolus congestus *Lister.* On fallen branch.

Margarita metallica *Lister.* On dead twig.

VIII—THE ANATOMY OF SOME LAURACEOUS SCENT-YIELDING WOODS KNOWN AS "MEDANG." B. ALWYN JAY.

Two papers on the structure of scent-yielding woods have recently been published in the Kew Bulletin (4 and 5). The present paper may be regarded as a continuation of this series, since it is concerned with the anatomy of certain scent-yielding woods of the *Lauraceae* from the Federated Malay States, where they are known collectively as "Medang." The name "Medang" is often qualified by the use of an adjective to differentiate the

species, but as these second names are not consistent throughout the range of distribution of the species, even in the locality where the specimens used in this investigation were collected, they have been omitted.

The material used consisted of numbered wood specimens, kindly supplied by Mr. H. E. Desch of the Forest Research Institute, Kepong, Federated Malay States. Their identity had been previously established from the corresponding herbarium material. During the course of the work, the herbarium material in question was sent to Kew on loan, where, after critical examination, some of the specimens were re-identified. The names used in the present paper are the ones assigned to the herbarium specimens after they had been examined at Kew. (A few specimens from the collections in the Kew museums were also examined).

The anatomical terms used in describing the woods are for the most part those defined in the Glossary recently compiled by a special committee of the International Association of Wood Anatomists (8).

The perfumery value of " Medang " is due to the presence of scent-yielding substances in specialised secretory cells in the wood. Gildemeister and Hoffmann (2) state that the oil of *Cinnamomum parthenoxylon* Meissn. consists chiefly of safrol. " Medang Loson " oil (obtained from the same species), is described in a paper in the Perfumery and Essential Oil Record (6) as being slightly inferior to safrol, but a useful, cheap substitute for it in perfuming soap. It seems probable that *C. parthenoxylon* and *C. inunctum* are the only species amongst those examined which are likely to be of value in perfumery, as these species alone were found to be strongly scented, whilst the others did not give off any appreciable odour, even when shavings of them were boiled in water. The sapwood of these species was found to be more strongly scented than the heartwood.

It is also of interest to note that no characters could be found whereby the wood of *C. parthenoxylon* could be distinguished from that of *C. inunctum*. Moreover the morphological differences between these species are small. According to Ridley (7) the leaves of *C. parthenoxylon* are glaucous, whereas those of *C. inunctum* are not. Gamble (1) makes the distinction that the axils of the leaf-nerves of *C. parthenoxylon* bear pitted glands, while those of *C. inunctum* have none. Mr. C. E. C. Fischer says that, in his opinion, these dissimilarities are hardly sufficient to differentiate these species with certainty, so that it is possible that they are identical. For these reasons *C. parthenoxylon* and *C. inunctum* have been described together. Moreover, since all the species dealt with resemble one another very strongly, the only complete description that has been drawn up is the one for these two species. Brief descriptions, including only those features which appear to be of diagnostic value, are given of the other species, thereby avoiding repetition.

The number of species examined during the course of this investigation is so small that no attempt has been made to find characters whereby the different genera may be distinguished from one another.

Most of the specimens were too small to show if the heart and sapwood are clearly defined.

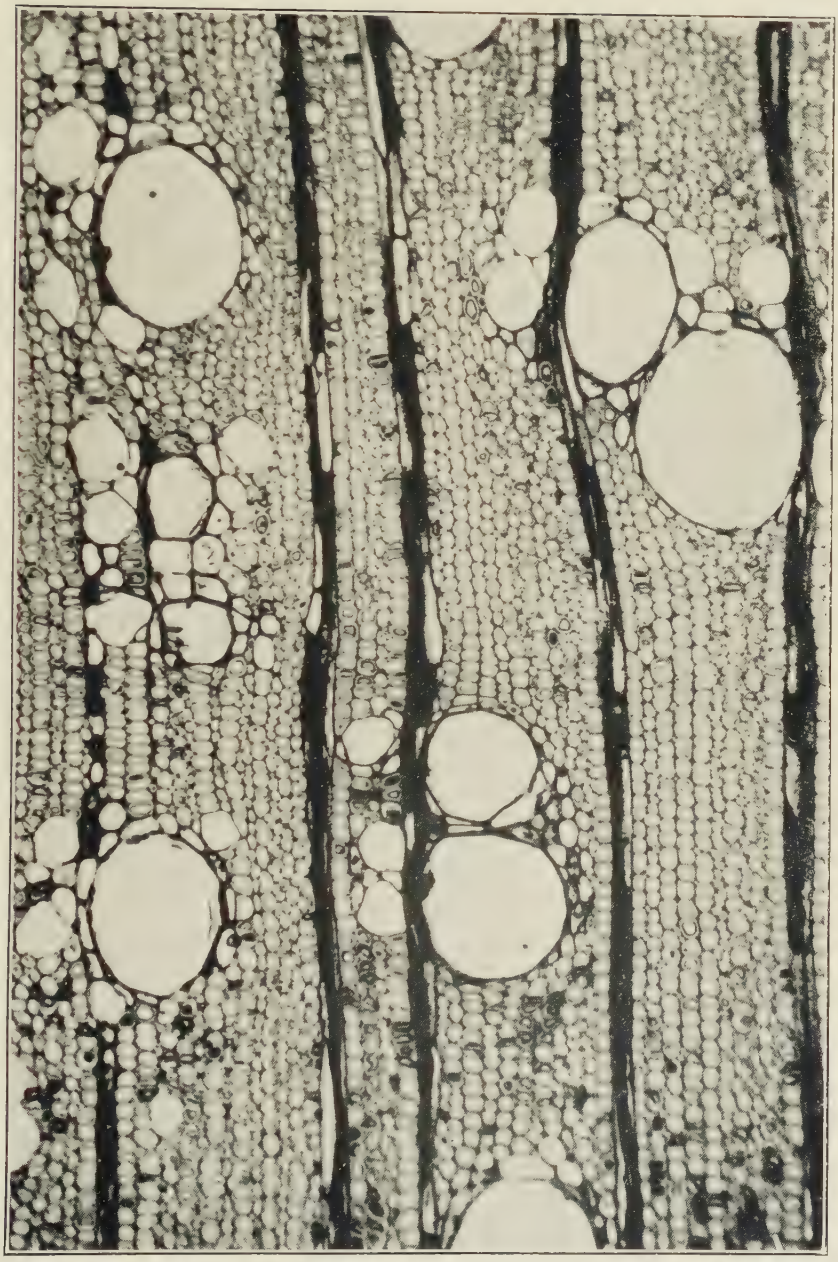
1. Cinnamomum parthenoxylon *Meissn.* and **C. inunctum** *Meissn.* (Pls. II and III.)

General Properties and Macroscopic Features.

A hard, fairly heavy wood with straight grain and somewhat oily texture. As far as could be ascertained from small specimens, the heartwood is yellow-brown and the sapwood grey-brown. *Growth rings :* just visible with naked eye. *Vessels :* just visible with naked eye, individually distinct under a lens (x 10), numerous, solitary and in radial groups of 2–3. No deposits observed. *Parenchyma :* small amount of paratracheal parenchyma just visible. *Rays :* fine, numerous, just visible to the naked eye. Somewhat lighter in colour than the rest of the wood.

Microscopic Features.

Growth rings : marked by 2–5 layers of radially flattened fibres contiguous to thin-walled fibres. *Vessels :* fairly evenly distributed, solitary and in radial groups of 2–3 (mostly 2), with occasional tangential clusters. Frequently contiguous to rays. Diameter of solitary vessels (including thickness of walls) radial 100–290μ (mostly about 180μ), tangential 80–240μ (mostly about 140μ). Circular to oval, uniform in size throughout growth-rings. Solitary vessels and groups per sq. mm. : 2–8 (mostly 4–6). Vessel-members : 200–770μ (mostly about 400μ) long. End walls horizontal to very oblique. Perforations simple and rarely scalariform. Occasional deposits. *Intervascular pits :* bordered, arranged alternately, borders circular to somewhat angular where pits are crowded, apertures elongated horizontally but not beyond border. *Vessel-parenchyma pits :* half-bordered, horizontally elongated. *Vessel-ray pits :* half bordered, circular to considerably elongated horizontally or obliquely. *Fibres :* Groundwork of the wood composed of fibres, the walls 4–9·5μ (mostly about 6μ) wide ; lumen only slightly wider than the walls, except at the boundaries of the growth rings. Maximum diameter of fibres : 15–38μ (mostly about 27μ). Tendency to be rectangular in shape in transverse section. 850–1970μ (mostly about 1400μ) long. Arranged in fairly regular radial rows : 0–2 septa per fibre. *Pits :* simple, vertically or obliquely elongated, minute. Occasional deposits and oil drops. *Parenchyma :* paratracheal parenchyma abundant, some vessels completely surrounded by 1–3 layers of cells. Metatracheal parenchyma less abundant, and in groups of up to 20 cells, usually contiguous to paratracheal parenchyma. Diameter of cells 23–73 × 15–55μ (mostly about 40 × 26μ) ; irregular in transverse



Cinnamomum parthenoxylon. Transverse Sect. × 105.

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Cinnamomum parthenoxylon. Tangential Sect. × 210.

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section but tending to be radially elongated, rectangular in longitudinal sections, ends horizontal. *Pits* between parenchyma cells : simple. *Rays* : 4–8 (mostly about 5) per mm., 1–3 seriate (mostly 2–3). Heterogeneous. 4–44 (mostly 15–20) cells high. Height 100–1160μ (mostly about 420–500μ). Width 15–54μ (mostly about 30μ)—including thickness of the walls. Not storied. Cells 7–20× 15–35μ (mostly about 15×26μ), oval with longer axes vertical. Apical cells frequently elongated. Tangenitial walls (radial section) mostly vertical, others somewhat oblique. *Pits between ray cells :* small, simple. Opaque, brown deposits frequent, also occasional oil-drops. *Secretory cells :* large, thin-walled secretory cells frequent in the wood parenchyma, and occasional at the edge of the rays. 100–800 (mostly 400–600) per sq. cm. Mostly 170–240×80–120μ ; oval with longer axes vertical. Contents : oil. (The test for oil used was to soak wood sections in a tincture of Alcanin, the oil being stained bright red.). *Traumatic tissue :* groups of very irregularly arranged thin-walled cells were observed, up to 3 mm. tangentially by 0·5 mm. radially ; which appeared to be of traumatic origin.

Material : Forest Research Institute, Kepong, F.M.S. Nos. 0531, 0523, 1647, 22006, and 3542.

2. Cinnamomum iners *Reinwdt.* (Pl. IV, no. 1.)

General Properties : a fairly soft, light wood with a dry texture, light grey in colour.

Microscopic Features : *Vessels :* 2–5 (mostly 2) in a group. Tangential diameter 53–140μ (mostly about 80–95μ). Number of solitary vessels and groups per sq. mm. : 9–14 (mostly about 11). Frequent tyloses. *Fibres :* 21–38μ (mostly about 23μ) wide, 320–1700μ (mostly about 1280μ) long. Non-septate. Walls 3·8–8·0μ (mostly about 4·5μ) thick, lumen never narrower than the walls. *Parenchyma :* very few vessels completely surrounded by paratracheal parenchyma. *Rays :* 100–1037μ (mostly about 390μ) high, 11–46μ (mostly 23–26μ) wide. Cells 7–50μ (mostly 19μ) high. Oil drops absent. *Secretory cells :* 20–60 per sq. cm. and mostly about 180×70μ. Contents : mucilage. This was not detected in any other species examined. This was noted by Janssonius (3).

Material : Forest Research Institute, Kepong. Nos. 11011 and 16506.

3. Alseodaphne penduliflora *Gamble.* (Pl. IV, no. 2.)

General Properties : a hard wood with a smooth texture. Dark brown in colour.

Microscopic Features : *Vessels :* in groups of 2–5, tending to be in oblique lines. Tangential diameter of solitary vessels : 46–131μ (mostly about 115μ). Number of solitary vessels and groups per sq. mm. 5–9 (mostly about 7). Only simple perforations observed. Abundant tyloses. *Fibres :* walls 3·8–7·6μ (mostly about 4·2μ) wide. Length 600–1790μ (mostly about 1200μ).

2–6 (mostly 4) septa per fibre. *Rays :* heterogeneous, but only procumbent and sheath cells observed. 130–1045μ (mostly about 530μ) high. 26–46μ (mostly about 40μ) wide. *Secretory cells :* 65–75 per sq. cm. Size, mostly about 120×60. *Traumatic tissue :* none observed.

Material. Forest Research Institute, Kepong. Nos. 3201 and 10607.

4. Dehaasia Curtisii *Gamble.* (Pl. V. no. 4.)

General Properties : a very heavy wood with a greasy texture. Glistening deposits in the vessels.

Microscopic Features : *Vessels :* in groups of 2–5. Tangential diameter 42–133μ (mostly about 100μ). Number of solitary vessels and groups per sq. mm. 6–12 (mostly about 9). Perforations : only simple ones observed. Tyloses abundant. *Fibres :* diameter mostly about 23μ. Length, 690–1700μ (mostly about 1270μ). 1–6 (mostly 3–4) septa per fibre. Walls, 3·5–12μ (mostly about 7μ) thick. *Rays :* 100–1160μ (mostly about 420–500μ) high. Mostly 26μ wide. *Secretory cells :* 60–80 (mostly about 70) per sq. cm. Mostly 170×70μ.

Material : Forest Research Institute, Kepong. Nos. 4626 and 5474.

5. Dehaasia cuneata *Blume.*

General Properties and Macroscopic Features : a very heavy wood with a greasy texture. *Parenchyma :* not visible with lens (×10).

Microscopic Features. *Vessels :* in groups of 2–10 (mostly 2–3). Tangential diameter 70–156μ (mostly about 110μ). Number per sq. mm. 6–14 (mostly 8–9). Perforations mostly scalariform, but some simple. (Fig. 1). No deposits observed. Tyloses variable, sometimes abundant. *Fibres :* 560–1750μ (mostly about 1220μ) long. 1–5 (mostly 2) septa per fibre. *Rays :* 15–43μ (mostly about 31μ) wide. No oil observed in rays. *Secretory cells :* about 40 per sq. cm. Size mostly about 195×66μ.

Material : Forest Research Institute, Kepong. Nos. 10396 and 27223.

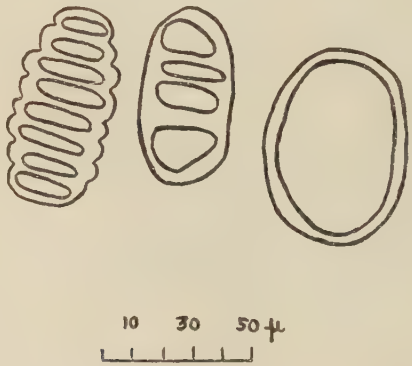
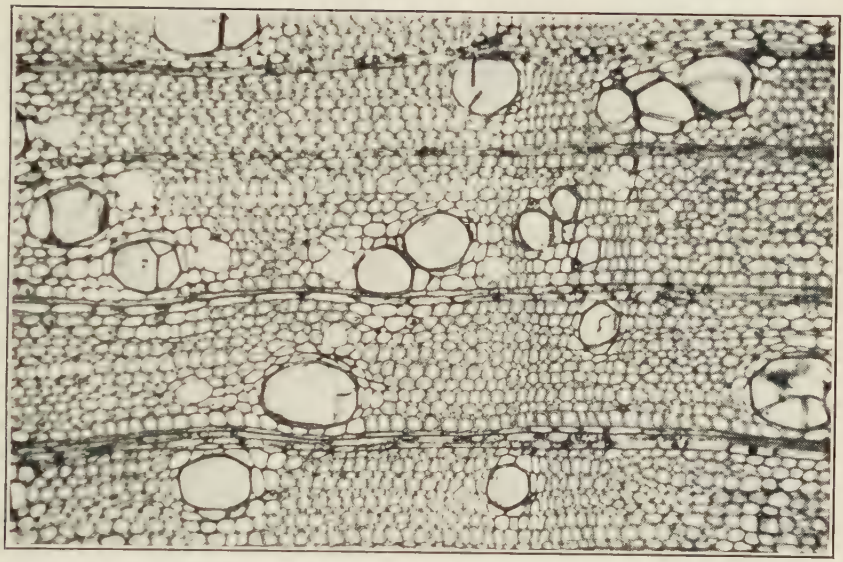
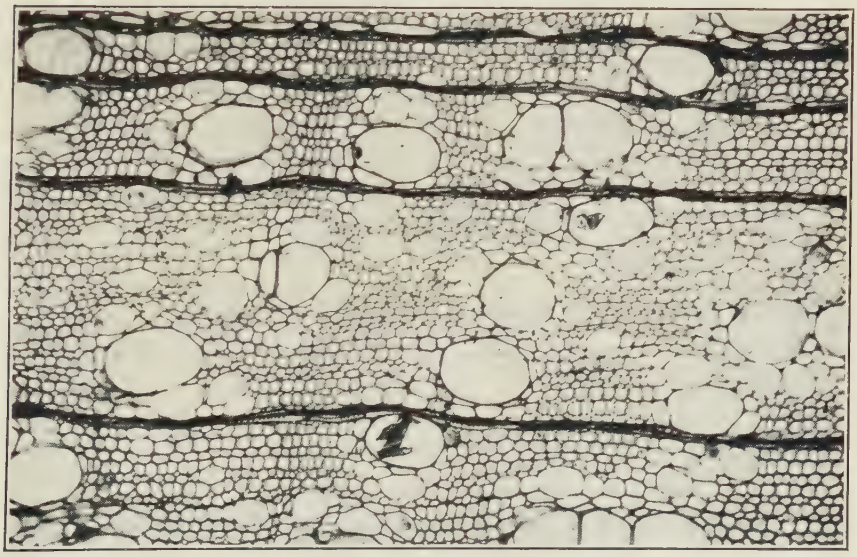


Fig. 1. *Dehaasia cuneata.* Three types of perforations to be seen in radial sections.



2. *Alseodaphne pendulifiora*. Transverse Sect. ×70.



1. *Cinnamomum iners*. Transverse Sect. ×70.

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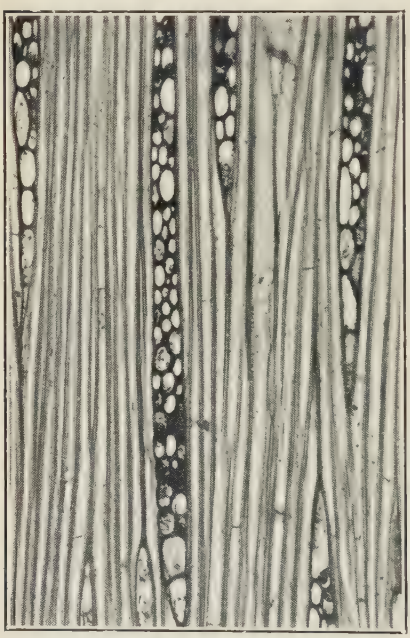
1. *Alseodaphne penduliflora*. Tangential sect. × 105.

2. *Litsea myristicaefolia*. Tangential sect. × 105.



3. *Litsea tomentosa*. Tangential Sect. × 105.

4. *Dehaasia Curtisii*. Transverse Sect. × 52½.

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6. Litsea castanea *Hook. f.* (Pl. VI, no. 3.)

General Properties. A light wood with a woolly texture. Light brown in colour.

Microscopic Features. *Vessels :* in groups of 2–5. Number of solitary vessels and groups per sq. mm. 6–14 (mostly 8–9). Perforations simple and scalariform. No deposits observed. *Fibres :* septation very variable, even in a single section. Walls 2·3–5μ (mostly about 3·4μ) thick. *Rays :* 86–1430μ (mostly about 516μ) high. Mostly about 25μ wide. *Secretory cells :* about 65 per sq. cm. Size mostly about 172×85μ. *Traumatic Tissue :* none observed.

Material : Forest Research Institute, Kepong. Nos. 10593 and 1870.

7. Litsea myristicaefolia *Wall. ex Hook. f.* (Pl. V, no. 2.)

General Properties. A light wood with a woolly texture. Light yellow-brown in colour.

Microscopic Features. *Vessels :* in groups of 2–5. 8–18 (mostly about 12) per sq. mm. Tangential diameter 70–150μ (mostly about 100μ). Perforations mostly scalariform, and also simple. No deposits observed. *Fibres :* 590–1500μ (mostly about 1200μ) long. Unseptate. Walls : 1·9–6μ (mostly about 3·8μ) thick. *Rays :* mostly about 300–430μ high. Mostly about 26μ wide. *Secretory cells :* about 110 per sq. cm. Size about 144× 78μ.

Material : Forest Research Institute, Kepong. Nos. 12582 and 4205.

8. Litsea megacarpa *Gamble.* (Pl. VI, no. 2.)

General Properties and Macroscopic Features. A fairly soft wood with a somewhat woolly texture. Light brown in colour. *Growth Rings :* not clearly defined.

Microscopic Features. *Growth Rings :* tending to undulate. *Vessels* : in groups of 2–5. Tangential diameter 160–260μ (mostly about 220μ). 1–5 (mostly 2–3) per sq. mm. Only simple perforations observed. *Fibres :* 19–46μ (mostly about 30μ) wide. 1390–2040μ (mostly about 1480μ) long. Unseptate or septa extremely rare. Walls : 1·9–4·6μ (mostly about 3μ) thick. No deposits observed. *Rays :* 1–4 seriate. 68–770μ (mostly about 340μ) high. 8–50μ (mostly about 24μ) wide. Height of ray cells 8–40μ (mostly about 20)μ. No oil drops although abundant deposits. *Secretory cells :* absent or not more than 5 per sq. cm. Size about 130×53μ. *Traumatic Tissue :* none observed.

Material : Forest Research Institute, Kepong. Nos. 8042, 29209, and 15276.

9. Litsea tomentosa *Blume.* (Pl. V, no. 3.)

General Properties and Macroscopic Features. Texture not oily. *Growth Rings :* none clearly visible with lens. *Parenchyma :* not visible with lens.

Microscopic Features. *Vessels :* in groups of 2–8. 4-12 (mostly about 7–8) per sq. mm. Tangential diameter 66–152μ (mostly about 117μ). Perforations : mostly scalariform and also simple. Occasional tyloses. *Fibres :* mostly about 23μ wide. 710–2176μ (mostly about 1440μ) long. Walls : 3·8–7·6μ (mostly about 5μ) thick. *Rays :* 223–1182μ (mostly about 700μ) high. Mostly about 40μ wide. *Secretory cells :* 0–2 per sq. cm. Size : mostly about 133×53μ. *Traumatic Tissue :* none observed.

Material : Forest Research Institute, Kepong. Nos. 11027 and 15264.

10. Nothaphoebe panduriformis *Gamble.* (Pl. VI, no. 1.)

General Properties and Macroscopic Features. A fairly hard but light wood with dry coarse texture. Heartwood light brown, sapwood light grey-brown. *Growth Rings :* very well defined. *Parenchyma* : none visible with lens.

Microscopic Features. *Vessels :* in groups of 2–5. 4–10 (mostly about 6) per sq. mm. Tangential diameter 102–190μ (mostly about 130μ). Only simple perforations observed. Occasional tyloses. *Fibres :* 850–1700μ (mostly about 1190μ) long. 1·9–4·6μ (mostly about 3μ) thick. *Rays :* 1–5 seriate. Cells mostly about 23μ high. *Secretory cells :* mostly about 31 per sq. cm. Size : mostly about 175×60μ. *Traumatic Tissue :* none observed.

Material : Forest Research Institute, Kepong. Nos. 8029 and 0587.

Acknowledgments.

I wish to thank the Director of the Royal Botanic Gardens, Kew, for laboratory facilities, and Dr. C. R. Metcalfe for his invaluable help and advice in preparing this paper.

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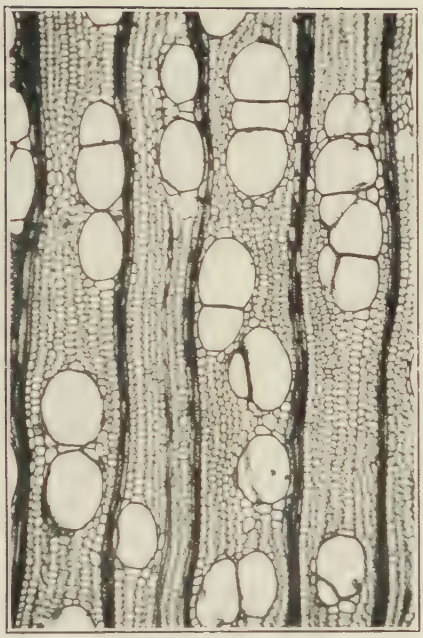
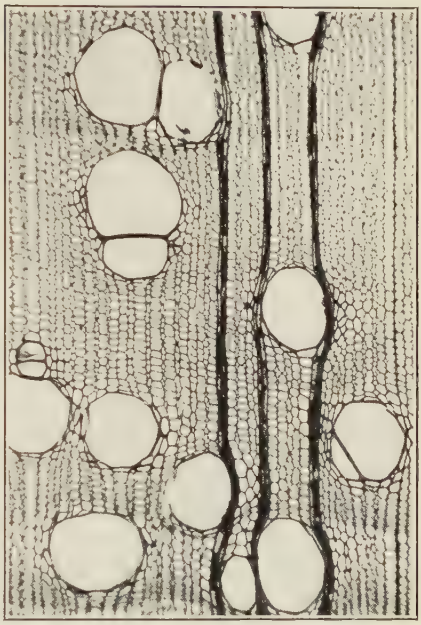
XI—THE EFFECTS OF THE FROST OF MAY 16th, 1935.

Royal Botanic Gardens. Kew.

The severe frost that occurred over the greater part of the country during the night of May 16th and the early morning of May 17th resulted in a good deal of injury to leaves, flowers and young shoots of trees and shrubs growing at Kew. Twelve degrees

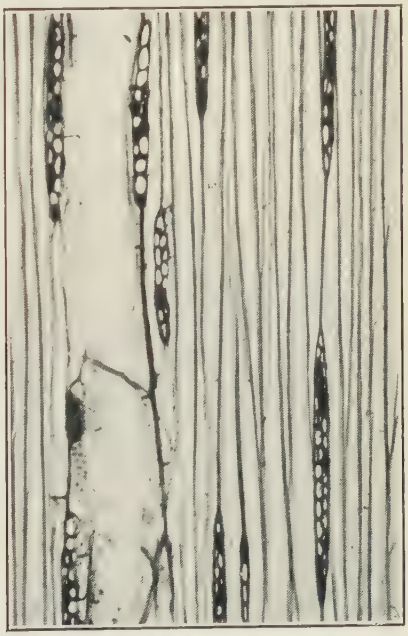


1. *Nothaphoebe panduriformis.* Transverse sect. × 52½.



2 *Litsea megacarpa.* Transverse Sect. × 52½.

3. *Litsea castanea.* Tangential Sect. × 105.



4. *Litsea megacarpa.* Tangential sect. × 105.

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(22° F) of frost were recorded on the ground and 5 degrees (27° F) in a screened thermometer four feet above the ground. The most serious effects were from ground level to a height of 20 feet, but on some trees leaves were injured up to 40 or 50 feet.

It was very noticeable that while most of our native plants suffered injury to their young shoots, many South European, Western Hemisphere and other plants which are not very winter-hardy with us—in most cases requiring the shelter of walls—did not suffer any injury, even to the young growth. These include *Eucryphia glutinosa*, *Nothofagus* spp., *Feijoa Sellowiana*, *Olea europaea*, *Myrtus communis* and var. *tarentina*, and also many semi-tender *Ceanothus* spp. from California, e.g. *C. rigidus*, *C. dentatus C. papillosus* and *C. thyrsiflorus*.

At the time of writing, January, 1936, one is better able to assess the real damage, and after careful inspection it is comforting to find that apart from the loss of flowers there is little trace of any permanent injury. This is due to the fact that in most cases, although the young leaves were killed, the growing points of the shoots were uninjured, with the result that they quickly made fresh growth. It remains to be seen how the floral display for this season may be affected.

The following is a list of plants whose reactions to the frost deserve comment, together with notes on the damage (or lack of it) that was observed.

Arboretum

Acer. In some places badly cut or browned as if scorched by fire. Partially developed leaves of *A. macrophyllum* browned.

Actinidia. Young shoots and leaves entirely killed.

Buddleja. The varieties of *B. variabilis* badly cut, but *B. globosa* nearby, undamaged.

Catalpa. New growth killed.

Celastrus. Chinese and Japanese species, young shoots badly damaged.

Davidia. *D. Vilmoriana*, shoots and flowers killed.

Diospyros. New growth killed.

Emmenopterys. *E. Henryi*, new shoots killed.

Fraxinus. In some places common ash badly cut and browned.

Ginkgo. Leaves damaged up to 25 feet ; above that unharmed.

Hedera. Young shoots and new leaves of ivy destroyed in exposed positions.

Juglans. New shoots and young leaves killed or badly damaged, including common walnut (*J. regia*).

Liriodendron. Leaves damaged up to 25 feet ; above that unharmed.

Magnolia. Young shoots, leaves and flowers badly damaged. Shoots of *M. Wilsoni*, *M. Dawsoniana* and *M. Sargentiana*, and of the newer Chinese species, also *M. Watsoni*, entirely killed.

Meliosma. *M. Veitchiorum*, new shoots killed.

Morus. Young shoots blackened.

Paulownia. New growth killed.

Platanus. *P. cuneata*, new growth killed.

Quercus. Turkey oaks badly cut in some places.

Rhododendron, Young shoots and flowers badly damaged, except in very sheltered positions. Fully opened flowers on bed of Loder's white in Broad Walk entirely destroyed. Young shoots of many Chinese species badly damaged, some entirely killed. Many new shoots and all flowers and opening buds of azaleas in the Azalea Garden entirely destroyed.

Schizandra. Young shoots and leaves entirely killed.

Styrax. *S. Veitchiorum*, new shoots killed.

Taxus. *T. baccata* vars. in nursery, new shoots killed.

Vitis. New shoots of practically all vines killed, including *Vitis coignetiae*, which has suffered badly.

Wisteria. Flowers and new shoots entirely killed in open and on exposed walls.

Herbaceous Ground

Dicotyledons.

Ranunculaceae. No damage.

Berberidaceae. *Epimedium rubrum* and *E. Youngianum* damaged, while *E. Youngianum* var. *niveum* escaped.

Papaveraceae *Macleaya* spp., damaged, while *Papaver*, *Podophyllum*, *Eschscholtzia* and *Argemone* escaped.

Fumariaceae *Dicentra oregona* and *D. formosa* were untouched.

Cruciferae, Violaceae, Resedaceae, Cistaceae, Caryophyllaceae and **Malvaceae, Linaceae,** uninjured.

Geraniaceae. *Impatiens* and *Tropaeolum*, seedlings killed. *Geranium anemonefolium*, badly damaged. *Limnanthes Douglasi* and *L. alba* in flower were not injured.

Sapindaceae. *Melianthus major* had five inflorescences fully developed, some 5 to 6 feet high, which were not damaged.

Rosaceae. *Tolmiea Menziesii* and *Tellima grandiflora* badly damaged; *Astilbe chinensis* slightly damaged.

Leguminosae. *Phaseolus* and *Glycine* killed, and *Vicia gigantea* badly damaged.

Loasaceae. *Datisca cannabina* badly damaged, but two inch seedlings of *Loasa* and *Blumenbachia* were untouched.

Cucurbitaceae. *Bryonia dioica* and *B. alba* damaged; *Echinocistus lobata* and *E. fabacea* 3 inch seedlings escaped, and *Ecballium Elaterium* unharmed.

Umbelliferae. Not injured.

Compositae. *Cosmos* killed. *Zinnias* cut to base. *Inula barbata* and *I. Hookeri* badly damaged. *Bupthalmum speciosum, Eupatorium ageratoides* and *Tripteris Vaillantii* badly damaged. *Helianthemums* one to two feet high, both annual and perennial, were unharmed.

Apocynaceae. *Vincetoxicum* spp. all damaged. *Asclepias* not injured.

Convolvulaceae. *Ipomoea coerulea* and other spp. killed. *Nolana* spp. untouched.

Solanaceae. *Nicotiana, Saracha* and *Physalis*, except *P. Franchettii* and *P. Alkekengii*, killed.

Scrophulariaceae. *Penstemon* spp. in flower damaged.

Labiatae. *Elsholtzia polystachya, Plectranthus rugosus, Elsholtzia Stauntoni* and *Comanthosphace sublanceolata* all badly damaged. *Eremostachys* untouched.

Polygonaceae. *Rheum* spp., *Polygonum paniculatum, P. cuspidatum, Fagopyrum cymosum* and *Oxyria sinensis* all badly damaged.

Euphorbiaceae. Several spp. of *Euphorbia* were in flower and were untouched, e.g., *E. Characias* and *E. epithymoides*.

Urticaceae. *Boehmeria nivea, Laportea canadensis* and *Parietaria officinalis* all badly damaged.

Cyperaceae and **Gramineae** untouched.

Liliaceae. No serious damage, but young growth injured in *Uvularia grandiflora* and *Hosta* spp.; many of the *Eremurus* were badly damaged, particularly those in a more exposed situation between the Rock Garden and Family Beds.

Amaryllidaceae. No apparent damage, even *Alstroemeria* escaped injury.

Dioscoreaceae. All species of *Dioscorea* were cut to the ground.

Iridaceae. The display of May and June flowering Iris was ruined, many of the varieties having the flowers or buds completely frozen, the damage being either to the soft stem below the flower or to the actual ovary of the flowers. This applied equally to the North American species—*I. tenax*, *I. Douglasii*, etc.,—though later buds matured and flowered well.

Hardy ferns. The majority of these were not sufficiently far advanced to be seriously damaged, but some varieties of *Aspidium* and *Asplenium* in particular were injured.

Rock Garden

Acer. All Japanese varieties, young growth damaged.

Bergenia. All species, particularly *B. ciliata* and *B. ligulatas*, open flowers and buds damaged.

Ceratostigma. *C. Willmottiana*, young growth damaged.

Cedrus. *C. Libani* var. *pygmaea*, young growth cut back.

Cupressus. *C. obtusa* varieties, young growth cut back.

Cypripedium. *C. parviflorum*, foliage damaged.

Epimedium. *E. pinnatum*, foliage damaged.

Erica. *E. carnea* and varieties, young growth damaged.

Kirengeshoma. *K. palmata*, badly cut.

Mertensia. *M. virginica*, flowers damaged.

Mimulus. *M. ringens*, flowers damaged.

Meconopsis. *M. regia*, flowers damaged.

Osmunda. *O. regalis*, one plant in exposed position, badly damaged ; others more sheltered, escaped.

Picea. *P. Abies* and *P. excelsa*, young growth cut back.

Primula. *P. japonica*, *P. pulverulenta* and other species, flowers badly damaged.

Penstemon. *P. Barrettae*, *P. Newberryi*, *P. Scouleri* and other species, flowers damaged.

Rhododendron. *R. obtusum*, *R. Davidsonianum* and *R. Williamsianum* (foliage) badly damaged.

Rodgersia. *R. podophylla* and *R. Purdomi* badly injured. *R. pinnata*, just starting, escaped.

Saxifraga. *S. Fortunei* and *S. sarmentosa* badly damaged.

Tricyrtis. *T. macrantha* and *T. hirta* badly damaged.

Tsuga. *T. canadensis* var. *pendula* and *T. Sieboldii* var. *nana*, young growth cut back.

While no permanent damage seems to have resulted from the frost it had a distinct effect on the seed crop, many of the injured plants had to make a second growth which failed to set and mature seeds.

National Pinetum Bedgebury.

W. Dallimore

A good deal of harm was done to the young trees at Bedgebury by the severe frost that occurred during the night of May 16th and the early morning of May 17th, but it is interesting to note that some species that are doubtfully hardy escaped serious injury, whereas perfectly hardy kinds so far as winter cold is concerned had all their young shoots killed, and here and there a tree or two of a particular species escaped, while the others were severely injured.

As has been noted on other occasions the severity of the frost varied in different parts of the 52 acres comprising the Pinetum. In a low place a short distance from Marshall's Lake 19 degrees of frost were registered on the ground. A few hundred yards away on ground 30 or 40 ft. higher, 14 degrees were recorded. In another part at a very similar elevation 13 degrees of frost occurred on the ground and 7 degrees were recorded by a screened thermometer

4 ft. 3 in. above the ground. Nearby, in the open, 11 degrees were registered at one foot above the ground and 9 degrees at 5 ft. In a low place in another part of the Pinetum 17 degrees of ground frost were recorded and at a high point near the gravel pit there were 15 degrees. Common plants such as bracken, brambles, nettles, ivy and grasses were injured, and young shoots were killed on oak, ash, walnut, rhododendrons, sweet chestnut, and holly. In some places old leaves of *Rhododendron ponticum* and other species, also of common laurels, were killed, and on some rhododendrons last year's wood was destroyed.

Amongst the trees in the collection the degree of injury was largely determined by the quantity of new growth that had been formed, the newer conifers from China being the greatest sufferers, but some species that usually escape frost injury were also cut. Pines, on the whole, were not far enough advanced to receive serious injury, but practically all the young shoots on the Japanese *Pinus parviflora* were frozen and the young growth on the Siberian *P. pumila* appears to have been checked.

Lawson's Cypress is usually regarded as a particularly hardy tree but it suffered more than the tenderer *C. macrocarpa*. In some places there was some browning of leaves on large trees of *C. Lawsoniana*, but natural seedlings suffered more. Some of them were quite brown and in early June looked as though they might be permanently injured. Several varieties of *C. Lawsoniana* suffered, notably *erecta filiformis, erecta viridis, Allumii, juniperina, lutea Pottensii, intertexta, tamariscifolia, Rosenthalii, Fletcheri, nivea, glauca*, and a dwarf unnamed variety. *Cupressus thyoides* planted in a low wet place where 17 degrees of frost were recorded escaped injury, but *C. Lawsoniana* growing nearby was browned. Occasion has previously been taken of directing attention to the value of *C. thyoides* for planting in wet ground in low-lying places. *C. nootkatensis* was not injured but the tips of shoots of *C. sempervirens* were frozen and *C. Duclouxiana* was turned brown. *C. lusitanica, C. Goveniana, C. macrocarpa* and *C. torulosa* were not appreciably affected. The hybrid *C. Leylandii* also escaped injury although growing in a low wet place.

The American species of *Abies* fared better than the Asiatic species. Of the former *A. lasiocarpa, A. balsamea, A. Fraseri* and *A. venusta* were most seriously injured. *A. nobilis, A. magnifica, A. grandis, A. amabilis* and *A. Lowiana* escaped; one or two trees of *A. concolor* were slightly browned. Of the Asiatic species *A. Forrestii, A. recurvata, A. nephrolepis, A. Veitchii, A. sachalinensis* and *A. Faxoniana* were all badly cut. Of *A. Mariesii, A. firma, A. homolepis* (*A. brachyphylla*), and *A. koreana* some trees were seriously injured, others not. Of three trees of *A. koreana* growing in a triangle about 10 ft. from each other, two were cut and the other one was practically unscathed. Several young oaks growing amongst these *Abies* had all their young shoots and leaves blackened.

Of European *Abies*, *A. Nordmanniana* and *A. Pinsapo* received little injury, but *A. alba* and *A. cephalonica* were badly cut. *A. cilicica* and *A. numidica* were also badly injured.

The tips of the shoots of a few larches were injured, particularly *Larix Potaninii*, but on the whole the larches came through the test very well, although they suffered badly on the forest plots. Some *Pseudotsuga* spp. were frozen, others escaped with little injury. The most seriously injured were *P. Forrestii*, *P. japonica*, *P. macrocarpa*, some trees of *P. glauca* and *P. Douglasii* var. *Fretsii*.

Tips of shoots of *Cunninghamia lanceolata* were frozen and the points of branches of *Cryptomeria japonica* var. *elegans* and *elegans nana* were killed. *Thuja dolabrata* received some injury but generally the thujas suffered less than some of the other genera. Tsugas were badly cut, particularly *T. chinensis*, *T. diversifolia*, *T. Sieboldii*, *T. Mertensiana* and some of the trees of *T. heterophylla*. One tree of *T. Sieboldii* escaped with little harm while other trees were badly frozen. *Cedrus atlantica* is little the worse for freezing but *C. Libani*, *C. brevifolia* and *C. Deodara* are slightly injured. The sequoias have practically escaped but some of the leaves of *S. sempervirens* are browned. The junipers have not suffered very much. Some shoots were killed on *Taxodium distichum* but they were not growing very fast at the time of the frost. *Taiwania cryptomerioides* has not been injured and *Sciadopitys verticillata* appears to be quite sound. A few yews were cut, chiefly *Taxus cuspidata* and its varieties, and some dwarf forms of *T. baccata*.

Spruces vary a good deal in the way they were affected. *Picea sitchensis* suffered badly, as also did *P. spinulosa*, *P. Smithiana*, *P. Abies* (*excelsa*) and varieties, *P. orientalis*, *P. Wilsonii*, *P. glauca*, *P. albertiana* and variety *conica*, *P. jezoensis* and variety *hondoensis*, *P. morrisonicola*, *P. asperata* (some trees), *P. likiangensis* (some trees), and *P. Glehni*. Species not badly injured are *P. rubra*, *P. polita*, *P. Koyamai*, *P. Maximowiczii*, *P. pungens*, *P. brachytyla*, *P. omorika*, *P. Schrenkiana* and *P. bicolor*. It is particularly interesting to note that *P. omorika* escaped even when growing in a low wet place. This is the most promising of the lesser known spruces for planting under forest conditions. *P. polita* is always the last of the spruces to break its growth and it usually escapes frost injury. Unfortunately it is of no value for commercial planting.

Many of the newer Chinese species of *Rhododendron* were badly frozen, also hybrids from them and from the Himalayan *R. Griffithianum* and *R. Foryunei*. As at Kew, hybrid rhododendrons containing a good deal of *R. catawbiense* blood escaped serious injury. In the low-lying parts common oaks 50 or 60 ft. high had all their leaves blackened. Ash was as bad, and beech trees, more particularly the purple-leaved beech, had many leaves browned. On higher ground the damage was rather less severe.

On my way to Bedgebury I had to visit Hartfield near East Grinstead, and in order to be able to see something of the condition of the trees in the valley between Tunbridge Wells and Hartfield,

I made the journey from Tonbridge by road. Everywhere on the lower ground oak and ash were black. Chestnut coppice was as bad, and large sweet chestnut trees had their leaves injured. Sycamore was badly cut, and in some places horse chestnut leaves were badly injured. On the common at Tunbridge Wells the inflorescences of one tree were killed and apparently dried on the branches, and on another tree most of the leaves were killed. Leaves of hazel in some places were badly injured as were also beech leaves. Ivy was also blackened. Large conifers, spruce, Douglas fir and larch do not appear to be seriously injured and birch and alder seem to be untouched. From what could be seen from the train the whole of the trees on the low ground between Sevenoaks and Paddock Wood had been as badly frozen as those between Tunbridge Wells and Hartfield, but on the ridges in all parts neither oak, ash, nor beech appeared to have received serious injury. After fifty years work amongst trees I cannot recall on any previous occasion anything approaching the devastation caused by that one night's frost.

The above account was written in June, 1934 and it is now possible to decide what the true extent of the frost injury was. In a number of species of *Picea*, *Abies* and *Tsuga*, terminal shoots formed in 1934 are dead, and new leaders can only be expected from dormant buds on the lower trunk. However, very few such buds broke into growth during the summer. A good many natural seedlings of Lawson's cypress were killed, otherwise few plants were lost, although there are some that look as though they may not recover. Pines were not permanently injured, though the average rate of annual growth was reduced. Douglas firs and Sitka spruces growing in plantations a few hundred yards away were even more severely injured than the trees in the Pinetum.

X—NEW OR NOTEWORTHY SOUTH AFRICAN PLANTS.* VIII.

New Compositae from the Transvaal. J. Burtt Davy and J. Hutchinson.

Tribe Senecionideae.

142. **Cineraria Burkei** *Burtt Davy*, sp. nov. ; affinis *C. erosae* Harv. sed capitulis circiter 8-floris differt, et *C. longipedi* S. Moore sed caulibus foliisque scabridis sublanatis, foliis irregulariter lyrato-pinnatilobatis differt.

Herba valida, erecta, ad 30 cm. alta ; caulis scaber, sublanatus, alte striatus. *Folia* irregulariter lyrato-pinnatipartita vel pinnatilobata, alte et acute dentata ; lobi laterales inaequales, oblongi vel obovati, superiores limbo 3–5-lobato confluentes. *Panicula* corymbosa, terminalis, conferta vel laxa ; pedunculi arachnoideo-pilosi, bracteis erectis muniti. *Capitula* circiter 8-flora, 8 mm.

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* Continued from the Kew Bulletin 1935 p. 572.

diametro. *Involucri bracteae* 5–7, quam flores disci breviores, acutae vel acuminatae, 5 mm. longae, glabrae vel basi leviter arachnoideo-pilosae. *Achaenia* hispida, margine angusto ciliato.

TRANSVAAL. Potchefstroom District: near Schoon Spruit, *Burke* sine numero, in Kew herb. (type).

Also in the Orange Free State, British Bechuanaland, and Griqualand West.

143. **Cineraria parvifolia** *Burtt Davy*, sp. nov., affinis *C. lyratae* DC., sed achaeniis pubescentibus, involucri bracteis pluribus differt.

Herba perennis, lignosa, caule et ramis glabris alte striatis. *Folia* 3–5-pinnatisecta; lobus terminalis ovato-cordatus, apice iterum 3–5-lobatus, margine alte (loborum lateralium minutius) dentatus; petiolus angulatus, basi auriculatus. *Inflorescentia* corymbosa, laxa; bracteae sparsae, subulato-lanceolatae; pedicelli 7–15 mm. longi. *Capitula* pauca, 6 mm. diametro. *Involucri bracteae* circiter 13, 4–5 mm. longae, glabrae, acutae, oblongae vel lanceolatae, costatae, margine ciliatae.

TRANSVAAL. Pretoria District: Irene, *Burtt Davy* 7791, in Kew herb. (type); Meintjes Kop, *Conrath* 470.

144. **Senecio Holubii** *Hutch. et Burtt Davy*, sp. nov.; affinis *S. concolori* DC., sed foliis pedunculis et involucri bracteis glabris, capitulis disciformibus nec radiatis differt.

Herba perennis (?) ad 40 cm. alta; caulis erectus, glaber, fistulosus (?), striatus, sicco circiter 3 mm. diametro, ramulos breves floriferos e nodis inferioribus emittens. *Folia* caulina superiora (cetera haud visa) internodiis aequilonga, ascendentia, glabra vel sparsissime albo-pilosa, 4–5 cm. longa, 0·15–0·4 cm. lata, linearia, obtusa, basi auriculata amplexicaulia, margine integra vel distanter sinuato-dentata. *Inflorescentia* subcorymbosa, pauciflora; pedunculi 1–8 cm. longi, erecti, glabri; bracteae paucae, patentes, ovatae, 1–2 mm. longae. *Capitula* solitaria, 8 mm. longa, 10 mm. lata, late campanulata; flores radii *O. Involucri* bracteae 12–15, circiter 6 mm. longae, lineares, glabrae; bracteae calyculi paucae, lanceolatae, parvae. *Achaenia* (immatura) in angulis scaberula.

TRANSVAAL. Marico District: Matebe Valley, *Holub* 1609–1611 in Kew herb. (types).

145. **Senecio Junodii** *Hutch. et Burtt Davy*, sp. nov.; affinis *S. pentactino* Klatt, sed capitulis paucioribus laxius corymbosis differt.

Suffrutex ad 1 m. altus; caules lignosi, foliati, striati, glabri vel leviter pubescentes. *Folia* glabra, subtus glaucescentia, ad 7 cm. longa, 1·2 cm. lata, lanceolata, ascendentia vel subpatentia,

apice subacuta, basi in petiolum brevem sensim attenuata, margine regulariter serrulata. *Capitula* pauca (circiter 12), laxe corymbosa, circiter 1 cm. longa ; pedunculus circiter 1 cm. longus. *Involucri* bracteae 6 mm. longae, glabrae ; bracteae calyculi exterioris latae, rigide ciliolatae. *Flores radii* flavi.

TRANSVAAL. Pietersburg District : " Shilouvane, in silvas Marovougne," March, *Junod* 1170 in Kew herb. (type).

146. **Senecio lydenburgensis** *Hutch. et Burtt Davy*, sp. nov. ; affinis *S. albanensi* var. *leiophyllo* Harv., sed achaeniis pubescentibus, caule basi lanato differt.

Herba perennis, 30–60 cm. alta ; caulis erectus, circiter 3 mm. diametro, parce foliatus, praeter basin lanatam glaber, internodiis folia caulina aequantibus. *Folia basalia* erecta, coriacea, glabra, circiter 12 cm. longa, 1 cm. lata, lanceolata, apice obtusa, basin versus attenuata, margine dentibus albis callosis crenulato-dentata ; petiolus tenuis, basi late amplexicaulis. *Folia caulina* sessilia, 3·5–5 cm. longa, 0·6–0·8 cm. lata, lanceolata vel oblonga, apice acuminata vel obtusa, basi subauriculata et late amplexicaulia. *Inflorescentia* corymbosa, parce ramosa ; bracteae basales foliaceae, lineari-lanceolatae ; rami ad 13 cm. longi ; pedunculi pro ramo 1–2, nudi vel bracteis 1–2 subulatis induti. *Capitula* circiter 1·2 cm. longa, 1·5 cm. lata, campanulata, calyculata ; flores radii flavi. *Involucri bracteae* circiter 1·2 cm. longae, acuminatae, floribus aequilongae ; calyculi bractae longae, lineares, acuminatae.

TRANSVAAL. Lydenburg District : by the Large Waterfall, Lydenburg, November, *Wilms* 809 in Kew herb. (type).

Conrath 507 from Modderfontein, Pretoria District, appears to belong here, but differs from the type in the shorter, less acuminate, more resinously-keeled involucral bracts, and the shorter leaves.

147. **Senecio Mooreanus** *Hutch. et Burtt Davy*, sp. nov. ; affinis *S. Sandersonii* Harv., a qua ramulis foliisque glabris, nec glanduloso-pubescentibus recedit.

Herba perennis ad 55 cm. alta ; caulis fistulosus, glaber, alte striatus, remote foliatus, internodiis circiter 4 cm. longis, basi circiter 5 mm. diametro. *Folia* glabra, coriacea, crassa, sessilia, 8–10 cm. longa, 1·1 cm. lata, linearia vel lineari-lanceolata, basi late amplexicaulia, apice obtusa, margine dentibus repandis callosis prominentibus. *Inflorescentia* subcorymbosa ; pedunculi 1–1·5 cm. longi, bracteis sparsis lanceolatis acuminatis muniti. *Involucri bracteae* ultra 1 cm. longae, pilis longis articulatis adpressis sparse pubescentes, margine late brunneo-scariosae.

TRANSVAAL. Carolina District : Carolina, Dec., *Bolus* 12031, in Kew herb. (type).

148. **Senecio scitus** *Hutch. et Burtt Davy*, sp. nov. ; affinis *S.*

bupleuroidi DC., sed capitulis multo majoribus manifestius campanulatis, pedunculis longioribus, et involucri bracteis pluribus majoribus differt.

Herba erecta perennis, ad 50 cm. alta ; caulis unicus nec infra inflorescentiam ramosus, gracilis, flexuosus, striatus, praeter basin dense cinereo-lanatam (sicco 2 mm. diametro) glaber. *Folia* glabra, quam internodia multo longiora, 10–15 cm. longa, linearilanceolata vel anguste lanceolata, acuminata, amplexicaulia, subtus glaucescentia, inferiora imbricata, superiora incurvo-patentia ; nervi paralleli, subtus prominentes. *Rami inflorescentiae* longi, divaricati, nudi ; bracteae basales solitares, breviter subulatae ; pedunculi glabri, 3–7 cm. longi, bracteis 1–4 parvis adpressis subulatis muniti. *Capitula* solitaria, circiter 1 cm. longa et 1·5 cm. lata ; *flores radii* flavi. *Involucri bracteae* circiter 15, glabrae, 0.5 cm. longae. *Achaenia* striata, glabra.

Transvaal. Lydenburg District : at Lydenburg, *Wilms* 762 in Kew herb. (type). Also in the Barberton, Carolina, Pretoria, and Witwatersrand Districts, and in Griqualand East.

149. **Senecio Serra** *Sond.* var. **macrocephalus** *Hutch. et Burtt Davy*, var. nov. ; a typo capitulis valde majoribus, involucri bracteis usque ad 8 mm. longis recedit.

Transvaal. Heidelberg District : farm Uitgevallen, near Vereeniging, *Burtt Davy* 9136 (type). Also in the Lydenburg, Pietersburg and Witwatersrand Districts, and in Natal.

Tribe Anthemideae.

150. **Athanasia calva** *Hutch.*, sp. nov. ; affinis *A. punctatae* Harv., a qua foliis saepe pubescentibus, receptaculo conico, et achaeniis epapposis facile distinguitur.

Planta lignosa, usque ad 50 cm. alta ; ramuli erecti, virgati, dense cinereo-tomentosi, striati. *Folia* oblanceolata, integra vel apicem versus 3–5-dentata vel serrata, subtus pubescentia vel glabrescentia, glandulis nigris conspicuis punctata. *Inflorescentia* densa, corymbosa, terminalis ; pedunculus circiter 3 cm. longus, bracteis ad 5 mm. longis ; pedicelli 1 cm. longi, bracteis paucis 1 mm. longis. *Involucrum* globosum, 6–8 mm. diametro ; bracteae circiter 5 mm. longae, lanceolatae, exteriores breviores ; receptaculum conicum. *Achaenia* epapposa.

Transvaal. Barberton District : Saddleback Mountain, March, *Galpin* 1312, in Kew herb. (type). Lydenburg District : at Pilgrim's Rest, April, *Rogers* 18551.

Natal. Charlestown and Van Reenen, *O. Kuntze.*

151. **Athanasia Dregeana** *Harv.* var. **sessilis** *Burtt Davy*, var. nov. ; a typo capitulis ad apicem ramulorum sessilibus differt.

Transvaal. Lydenburg District: at Lydenburg, *McLea* 5730, in Bolus herb. (type).

Better material may prove this to be a distinct species. Typical *A. Dregeana* Harv. occurs in Natal, Griqualand East, and Pondoland (between the Umzimkaba and Umzimvula Rivers, *Drège*, type).

152. **Athanasia turbinata** *Burtt Davy*, sp. nov.; affinis *A. linifoliae* Harv. (non Linn.) sed capitulis turbinatis differt.

Planta lignosa, usque ad 30 cm. alta; rami pauci, virgati, glabri, striati. *Folia* ad 2 cm. longa, 1 mm. lata, linearia, integra. *Inflorescentia* terminalis, dense corymbosa; bracteae sparsae, lanceolatae, circiter 2 mm. longae; pedunculi et pedicelli gracillimi. *Involucrum* turbinatum, 3 mm. longum, apice 3 mm. latum; bracteae angustissimae, glanduliferae, ad 2 mm. longae. *Capitulum* circiter 15-florum. *Achaenia* epapposa.

Transvaal. Lydenburg District: at Lydenburg, October, *Wilms* 792 and 792a, in Kew herb. (types).

153. **Chrysanthemum lasiopodum** *Hutch.*, sp. nov.; affine *C. decurrenti* Hutch., sed ramulis puberulis, foliis minoribus 6–8-pinnatipartitis differt.

Herba perennis ad 40 cm. alta; caulis unicus erectus, basi villosus, striatus, sparse et breviter pilosus, ramulis brevibus fastigiatis densifoliatis puberulis. *Folia* imbricata, adpressa, circiter 6 mm. longa, 6–8-pinnatipartita; lobi 1·5–3 mm. longi, linearisubulati, glabri, glanduloso-punctati, apice longe mucronati, 2 basales reflexi. *Capitula* solitaria, terminalia, longe pedunculata, circiter 1·5 cm. diametro; pedunculi glabri, striati, 10–20 cm. longi, foliis fasciculatis sparse vestiti. *Involucrum* circiter 0·5 cm. longum, 1·2 cm. latum; bracteae ovatae, 0·5 cm. longae. *Flores radii* ligulati, 1 cm. longi; flores disci circiter 0·8 cm. longi. *Achaenia* plus minusve glandulosa; pappus bene evolutus, corollae tubi dimidio aequilongus.

Transvaal. Lydenburg District: at Elandspruitbergen, alt. 7,600 ft., December, *Schlechter* 3846, in Kew herb. (type).

I am in some doubt as to the generic position of this species. The habit, pappus, etc., are those of *Chrysanthemum*, but the achenes are somewhat glandular as in *Phymaspermum*; it appears to be almost intermediate between the two genera.—J.H.

Tribe Inuleae.

154. **Callilepis lancifolia** *Burtt Davy*, sp. nov.; affinis *C. Laureolae* DC., sed foliis oblanceolatis subpetiolatis, pappi squama una producta valde angustiore differt.

Herba erecta, perennis, ad 30 cm. alta, e caudice lignoso caules annuos emittens; ramuli hispiduli, leviter striati, dense foliati. *Folia* ascendentia subpetiolata, pilis mollibus sparse pubescentia, 2·5–5 cm. longa, 0·3–0·6 cm. lata, anguste oblanceolata, acuta, ad

basin sensim attenuata. *Capitulum* solitarium, circiter 1·3 cm. longum, 4 cm. latum; pedunculus elongatus, ad apicem foliis gradatim minoribus laxe vestitus. *Flores radii* ad 2 cm. longi; ligula ad 7 mm. lata. *Achaenia* unilateraliter alata; squama una producta, anguste lanceolata, acuminata, ceterae minutae.

TRANSVAAL. Carolina District: near Carolina, November, *Rogers* 19689, in Kew herb. (type). Barberton District: Kaapsche Hoop, *Rogers* 21285.

155. **Tarchonanthus Galpinii** *Hutch. et Phillips* sp. nov.; affinis *T. trilobo* DC., a qua foliis haud cuneatis nec breviter lobatis neque sinuato-dentatis recedit.

Arbor vel *frutex*; ramuli novelli et petioli albido-flavo- vel fulvo-tomentosi vel fere lanati, annotini incano-fulvo-tomentelli, cicatricibus foliorum numerosis propinquis notati; petioli lati, complanati, fere alati, leviter decurrentes, circiter 1 cm. longi. *Folia* elliptica vel oblongo-lanceolata, apice acuta vel obtusa vel rotundata, basi cuneata, 7·5–14·5 cm. longa, 1·5–4·5 cm. lata, supra glabrescentia, bullata et minute areolata, infra reticulata, dense albido-flavo- vel albido-tomentosa, margine integerrimo vel leviter et irregulariter dentato. *Inflorescentiae* prope apicem ramulorum axillares, foliis circiter aequilongae; bracteae lineares vel subulatae vel oblongo-spatulatae, circiter 1 cm. longae, lanatae. *Capitula* lanata, femina uniflora.

TRANSVAAL. Barberton District: Hyslops Creek, at 2800 ft. *Galpin* 926, in Kew herb. (type). Lydenburg District: Farm Magaliesknop, at edge of forest, *Kotze* in Forest Herb. 2808. Waterberg District: Pyramid Estate near Potgietersrust, ravine in Granite Mts. at 5500 ft. *Galpin* 9000. Flowering March-April.

Mr. Kotze's specimen is from a tree with branched bole, described as about 30 ft. high, the largest limb having a girth at breast height of 3 ft. 10 ins.

XI—THE DATES OF HOOKER'S "BOTANICAL MISCELLANY."*—H. S. MARSHALL.

This periodical consists of three volumes dated, (on their title-pages), "1830," "1831" and "1833" respectively, and these dates have been accepted as correct in botanical works of reference such as Pfeiffer's Nomenclator (1873–74), the Index Kewensis (1893–95), Dalla Torre et Harms, Genera Siphonogamarum (1900–07), Post et Kuntze, Lexicon Generum Phanerogamarum (1903), and Lemée, Dictionnaire . . . des genres de plantes phanérogames (1929—35). Actually, however, the three volumes appeared in nine parts from

* See The Dates of Hooker's "Companion to the Botanical Magazine" (K. B. 1933, 362).

April 1829 to March 1833 inclusive. Owing to the considerable number of new genera and species * whose dates of publication are concerned, it has seemed worth while to make an extended search in the botanical literature of the period for notices and reviews of the several parts of the " Botanical Miscellany." Information has been obtained from the following sources :—

Loudon's Magazine of Natural History, **1**–**6** (1829–33) ; Loudon's Gardener's Magazine, **5**–**9** (1829-33) ; Edinburgh Journal of Natural and Geographical Science, **1** (1830) ; Annales des Sciences Naturelles, sér. 1, **18** (1829) ; Flora oder Botanische Zeitung, 1829–30 ; Literaturberichte zur Flora oder allgemeinen botanischen Zeitung, 1832 ; Botanische Literatur-Blätter . . . von der Königl. botanischen Gesellschaft zu Regensburg, **2** (1829) ; Linnaea, **5**–**9** (1830–34) ; Wikström, Jahresbericht der Schwed. Akad. Wiss. über die Fortschritte der Botanik im Jahre 1829 (1834) ; et op. cit. 1830 (1834) ; 1832 (1835) ; 1833 (1835) ; 1834 (1836).

The evidence as to the date of publication of part 1 is slightly conflicting. According to Linnaea, **5**, Litt.–Ber. 175–177 (1830), it appeared in 1828, but the date 1829 is given both in Ann. Sci. Nat. **18**, Rev. Bibl. 70 (1829), and in Wikström, Jahresb. Bot. 1829, 64 (1834), and the more precise date " April 1829," supplied in Bot. Lit.-Blätter, **2**, 125 (1829), is accordingly accepted here as correct.

Hooker's original intention was to publish the " Botanical Miscellany " in quarterly parts, as is indicated in Ann. Sci. Nat. (l.c.), Wikström, Jahresb. Bot. (l.c.), Loud. Gard. Mag. **5**, no. 20, 303 (1829), and Loud. Mag. Nat. Hist. **6**, no. 33, 264 (May 1833), but the financial support required for a quarterly issue was not forthcoming, and the work seems to have been issued at approximately half-yearly intervals (see below), the ninth and concluding part appearing in March 1833 (Loud. Gard. Mag. **9**, 349 : 1833). Publication was discontinued owing to lack of support by the botanical public. The price of each part, containing on the average over 120 pages of letterpress and (in the early parts) 25 plates, was only 15/- coloured, 10/6 plain (Loud. Gard. Mag. **5**, 303), but the number of copies sold was apparently insufficient to meet the cost of publication. Hooker accordingly brought out a " second series " of the " Botanical Miscellany " in a less expensive form, under the title " The Journal of Botany," each part, price 7/6, containing six sheets of letterpress and 8 plates (see wrapper of Curtis's Botanical Magazine for April 1st, 1834).

Part 2 of the "Botanical Miscellany" appeared in September 1829† and part 3 in the early part of 1830. A review of vol. 1, given

* 30 new genera and 1 new generic name, 428 new species, and 23 new combinations and names of species.

† It is reviewed as "Part 2 for September " in Loud. Gard. Mag. **6**, no. 28, Oct. 1830, 564. This must have been Sept. 1829, since Part 2 was reviewed in Edinb. Journ. Nat. Geogr. Sci. **1**, 438 (March 1830).

in the " Edinburgh Journal of Natural and Geographical Science " for March 1830, mentions part 3 as unpublished but gives a full summary of its contents. It was reviewed in " Flora " on 21 July, 1830. Part 4 was published after 22 October, 1830, since it contains an obituary notice of Robert Barclay, who died on that date. The notice was written in 1830* by Hooker, who refers to Barclay's death as " recent." As it was contained in the last sheet of part 4, it is probable that that part appeared in November or December 1830. Parts 5 and 6 appeared in 1831, according to Literaturberichte zur Flora 1832, **2,** 32, the months of publication not being stated. The date of publication of part 7 has not been ascertained with certainty. It probably appeared in the spring of 1832, since it is not mentioned in Loud. Gard. Mag. **8,** no. 37 (April 1832), 204, where parts 5 and 6 are reviewed, and we know that part 8 was published on 1 August, 1832. Part 9 appeared on 1 March, 1833 (Loud. Gard. Mag. **9,** 349 : 1833).†

Taking all the ascertained facts together, it seems reasonable to conclude that two parts of the " Botanical Miscellany " appeared per annum, in spring and autumn respectively. The dates of publication of the nine parts may accordingly be stated as follows :

Part 1, April 1829 ; part 2, September 1829 ; part 3, spring or summer 1830.—vol. 1, dated 1830.

Part 4, after 22 Oct. 1830 ; part 5, [spring ?] 1831 ; part 6, [autumn ?] 1831.—vol. 2, dated 1831.

Part 7, [spring ?] 1832 ; part 8, 1 Aug. 1832 ; part 9, 1 March 1833.—vol. 3, dated 1833.

The precise contents and the dates of publication of each of the nine parts are given below, followed by references to the sources of information in each case.

VOLUME **1** (title-page dated 1830).

Part 1, pp. 1–96, tt. i–xxv : April 1829.—*See* Loud. Mag. Nat. Hist. **2,** no. 7, May 1829, 193 ; Ann. Sci. Nat. **18,** Rev. Bibl., Juin 1829, 70 ; Flora oder Bot. Zeit. 1829, **1,** 184 [date given as Jan. 1829, but the Part was apparently not seen by the writer, who erroneously gave the title as " Miscellanea Botanica "] ; Bot. Lit.-Blatter, **2,** 125, 226 (1829) ; Edinb. Journ. Nat. Geogr. Sci. **1,** 438 (1830) ; Linnaea, **5,** Litt.-Ber. 175 (1830) ; Wikström, Jahresb. Bot. 1829, 64 (1834).

Part 2, pp. 95 bis—236, tt. xxvi–l : September 1829.—*See* Edinb. Journ. Nat. Geogr. Sci. **1,** 438 (1830) ; Loud. Gard. Mag. **6** no. 28, October 1830, 564 ; Linnaea, **6,** Litt.-Ber. 151 (1831) ; Wikström, Jahresb. Bot. 1829, 65 (1834).

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* " In the summer of the present year his strength began to decline " Hooker in Hook. Bot. Misc. **2,** 125.

† The less precise date " early in April " is given in Loud. Mag. Nat. Hist. **6,** 264 (1833).

Part 3, pp. 237–356, tt. li–lxxv : spring or summer 1830.—*See* Edinb. Journ. Nat. Geogr. Sci. **1,** 437 (" Part 3 unpublished "), 439 (March 1830) ; Flora oder Bot. Zeit. 1830, **2,** 440 (21 Juli 1830) ; Linnaea, **6,** Litt.-Ber. 151 (1831) ; Wikström, Jahresb. Bot. 1830, 86 (1834).

VOLUME **2** (title-page dated 1831).

Part 4, pp. 1–128, suppl. tt. i–x : after October 22, 1830.*—*See* Wikström, Jahresb. Bot. 1832, 80 (1835).

Part 5, pp. 129–256, tt. lxxvi–xcv : [spring ?] 1831.—*See* Loud. Gard. Mag. **8,** no. 37, April 1832, 204 ; Literaturberichte zur Flora oder allg. bot. Zeit. 1832, **2,** 32 ; Wikström, Jahresb. Bot. 1832, 85 (1835).

Part 6, pp. 257–416, suppl. tt. xi–xix : [autumn ?] 1831.—*See* Loud. Gard. Mag. **8,** no. 37, April 1832, 204 ; Literaturberichte zur Flora oder allg. bot. Zeit. 1832, **2,** 32 ; Wikström, Jahresb. Bot. 1832, 88 (1835).

VOLUME **3** (title-page dated 1833).

Part 7, pp. 1–128, suppl. tt. xxi–xxxii : [spring ?] 1832.—*See* Wikström, Jahresb. Bot. 1832, 88 (1835).

Part 8, pp. 129–256, tt. xcvi–cxii : 1 August 1832.—*See* Lindley in Bot. Reg. **18,** sub t. 1545, in adnot. (December 1, 1832) ; Loud. Gard. Mag. **8,** no. 41, Dec. 1832, 712 ; Wikström, Jahresb. Bot. 1832, 89 (1835).

Part 9, pp. 257–390, suppl. tt. xxxiii–xli : 1 March 1833.—*See* Loud. Mag. Nat. Hist. **6,** no. 33, May 1833, 264 ; Loud. Gard. Mag. **9,** no. 44, June 1833, 349 ; Linnaea, **9,** Litt.-Ber. 100 (1835) ; Wikström, Jahresb. Bot. 1834, 107 (1836).

" Suppl. tab. xx " appears never to have been published, the last plate of the supplementary series in vol. **2** being numbered xix and the first plate in vol. **3** " Suppl. tab. xxi."

A list of the new genera and species described in the " Botanical Miscellany," and of the new names and combinations, is given below. New generic names are printed in clarendon type. The dates of publication can be ascertained on reference to the list of parts.

FUNGI

Cyclomyces Kunze ex Hook. **2,** 150.†
Cyclomyces fusca Kunze ex Hook. **2,** 150.†
Simblum periphragmoides Klotzsch **2,** 164.
Thelephora Kunzii Hook. **2,** 163.§

HEPATICAE

Jungermannia Berteroana Hook. **2,** 148.
Monoclea crispata Hook. **1,** 117.

MUSCI

Brachymenium pulchrum Hook. **1,** 136.
Bryum giganteum Hook. **1,** 37.
,, *Gilliesii* Hook. **1,** 3.
,, *Menziesii* Hook. **1,** 36.
Dicranum phascoides Hook. **1,** 39.
Gymnostomum amblyophyllum Gill. et Hook. **1,** 352.
,, *Wilsoni* Hook. **1,** 143.

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* An obituary notice of Robert Barclay, who died on 22nd Oct. 1830, is given on pp. 122-125. The introduction to Wight's " Illustrations of Indian Botany " is dated 20th October, 1830 (p. 97).

† Names published previously by Fries in Linnaea, **5,** 512 (1830).

§ Published previously under the name *Thelephora luteo-badia* by Fries, l.c. 526.

Neckera Douglasii Hook. **1**, 131.
Phascum tetragonum Hook. **1**, 124 : erroneously attributed to Harvey in Ind. Bryolog. Ed, 2, **4**, 354.

Scouleria Hook. **1**, 33, gen. nov. (Grimmiaceae).
Scouleria aquatica Hook. **1**, 33.
Weissia reticulata Hook. **1**, 121.

FILICES

Angiopteris longifolia Grev. et Hook. **3**, 227.
Botrychium subcarnosum Wall. **3**, 222.
Cryptogramma retrofracta Grev. et Hook. **3**, 385.
Ophioglossum parvifolium Grev. et Hook. **3**, 218.
,, *Wightii* Hook. et Grev. **3**, 218.
Osmunda Hilsenbergii Hook. et Grev. **3**, 230.
,, *pilosa* Wall. **3**, 229.
,, *speciosa* Wall. **3**, 230.
Polypodium flaccidum Wall. **2**, 363.
,, *fulvescens* Hook. et Grev. **2**, 239.
,, *gracile* Hook. et Grev. **2**, 239.
,, *melanopum* Grev. et Hook. **3**, 384.
,, *stipitatum* Hook. et Grev. **2**, 239.

LYCOPODIACEAE

Lycopodium affine Hook. et Grev. **2**, 364.
,, *aloifolium* Wall. **2**, 367.
,, *anomalum* Hook. et Grev. **2**, 400.
,, *argenteum* Wall. **2**, 384.
,, *brachystachyum* Hook. et Grev **3**, 107.
,, *brevifolium* Hook. et Grev. **3**, 104.
,, *calostachyum* Hook. et Grev. **3**, 108.
,, *caulescens* Wall. **2**, 382.
,, *chrysocaulon* Hook. et Grev. **2**, 401.
,, *cochleatum* Hook. et Grev. **2**, 395.
,, *crassicaule* Hook. et Grev. **2**, 382.
,, *dilatatum* Hook. et Grev. **2**, 394.
,, *divaricatum* Wall. **2**, 377.
,, *Douglasii* Hook. et Grev. **2**, 396 : *L. ovalifolium* Hook. et Grev. Ic. Fil. t. 177 (1831), non Desv. (1813).
Lycopodium fissidentoides Hook. et Grev. **2**, 395.
,, *inaequalifolium* Hook. et Grev. **2**, 391.
,, *integerrimum* Hook. et Grev. **2**, 396.
,, *latifolium* Hook. et Grev. **2**, 386.
,, *lepidophyllum* Hook. et Grev. **3**, 106.
,, *longipes* Hook. et Grev. **2**, 372.
,, *Lyallii* Hook. et Grev. **2**, 387.
,, *Macraei* Hook. et Grev. **3**, 108.
,, *Menziesii* Hook. et Grev. **2**, 390 : *L. arbuscula* Kaulf. sec. Hook. et Grev. Ic. Fil. t. 200 (1831), non Kaulf. (1824).
,, *nitidum* Hook. et Grev. **2**, 397.
,, *ornatum* Hook. et Grev. **3**, 108.
,, *pallidum* Hook. et Grev. **2**, 389.
,, *Parkeri* Hook. et Grev. **2**, 388.
,, *Poeppigianum* Hook. et Grev. **2**, 393.
,, *praelongum* Hook. et Grev. **3**, 107.
,, *Preslii* Hook. et Grev. **2**, 377 : *L. serpens* Presl, Rel. Haenk. 81 (1825–36), non Desv. (1813).
,, *protensum* Hook. et Grev. **3**, 105 : *L. verticillatum* Linn. sec. Hook. et Grev. in Hook Bot. Misc. **2**, 367 (1831), nomen.
,, *pubescens* Wall. **2**, 383.
,, *pulvinatum* Hook. et Grev. **2**, 381.
,, *radicatum* Hook. et Grev. **2**, 397.
,, *reticulatum* Hook. et Grev. **2**, 402.
,, *Roxburghii* Hook. et Grev. **2**, 390.
,, *semicordatum* Wall. **2**, 396.
,, *subdiaphanum* Wall. **2**, 401.
,, *tenerum* Hook. et Grev. **2**, 400.
,, *tetragonostachyum* Wall. **2**, 389.
,, *vernicosum* Hook. et Grev. **2**, 364.
,, *Wallichii* Hook. et Grev. **2**, 384.
,, *Wightianum* Wall. **2**, 379.

PHANEROGAMAE

Acacia adenopa Hook. et Arn. **3**, 206.
,, *Aroma* Gill. **3**, 206.
,, *bonariensis* Gill. **3**, 207.

Acacia Bonplandii Gill. ex Hook. **3,** 205.
,, *furcata* Gill. **3,** 206.
,, *lepidota* Hook. et Arn. **3,** 205.
,, *Sprengelii* Hook. et Arn. **3,** 205 : *A. incana,* Spreng. Syst. **3,** 137 (1826).
Acaena caespitosa Gill. **3,** 307.
,, *cuneata* Hook. et Arn. **3,** 307.
,, *integerrima* Gill. **3,** 306.
,, *splendens* Hook. et Arn. **3,** 306.

Adenocaulon Hook. **1,** 19, gen. nov. (Compositae).

Adenocaulon bicolor Hook. **1,** 19.
Adesmia aspera Gill. **3,** 190.
,, *bracteata* Hook. et Arn. **3,** 193.
,, *coluteoides* Gill. **3,** 190.
,, *coronilloides* Gill. **3,** 190.
,, *Gilliesii* Hook. et Arn. **3,** 188.
,, *grandiflora* Gill. **3,** 190.
,, *horrida* Gill. **3,** 191.
,, *leiocarpa* Hook. et Arn. **3,** 189.
,, *Loudonia* Hook. et Arn. **3,** 193.
,, *mucronata* Hook. et Arn. **3,** 189.
,, *pedicellata* Hook. et Arn. **3,** 191.
,, *pinifolia* Gill. **3,** 192.
,, *retrofracta* Hook. et Arn. **3,** 188.
,, *trifoliolata* Gill. **3,** 194.
,, *trijuga* Gill. **3,** 191.
,, *uspallatensis* Gill. **3,** 192.
,, *viscosa* Gill. **3,** 192.
Alstroemeria dulcis Hook. **2,** 237.
Alternanthera nigriceps Hook. **2,** 237.
Apium chilense Hook. et Arn. **3,** 353.
Arenaria andicola Gill. **3,** 148.
,, *bonariensis* Gill. **3,** 148.
Argemone rosea Hook. **2,** 207.
Arum crenatum Wight, **2,** 100.
Asteriscium isatidicarpum Hook. et Arn. **3,** 349 : *Mulinum isatidicarpum* DC.
Asteriscium polycephalum Gill. et Hook. **1,** 332.

Astragalus Benthamianus Gill. **3,** 187.
,, *complicatus* Gill. **3,** 187.
Astrephia laxa Hook. et Arn. **3,** 364 : *Fedia laxa* Hook. et Arn.
Astrephia lobata Hook. et Arn. **3,** 364.
Atropa glandulosa Hook. **2,** 230.
,, *rhomboidea* Gill. et Hook. **1,** 135.
Azara Gilliesii Hook. et Arn. **3,** 144.
Azorella Gilliesii Hook. et Arn. **3,** 347 : *Bolax Gilliesii* Hook.
Banisteria bonariensis Hook. et Arn. **3,** 157.

Berberis chilensis Gill. **3,** 135.
,, *corymbosa* Hook. et Arn. **3,** 135.
,, *Grevilleana* Gill. **3,** 136.
Betckea Gilliesii Hook. et Arn. **3,** 366.
Bigelovia eryngioides Hook. et Arn. **3,** 360 : *Borreria eryngioides* Cham. et Schlecht.
Bolax Gilliesii Hook. **1,** 325.
Bowlesia tropaeolifolia Gill. et Hook. **1,** 325.

Bridgesia Hook. **2,** 222, gen. nov. (Compositae)—now reduced to *Polyachyrus* Lag. (1811).
Bridgesia echinopsoides Hook. **2,** 222.

Bridgesia Hook. et Arn. **3,** 168, gen. nov. (Rutaceae)—now reduced to *Ercilla* A. Juss. (Phytolaccaceae).
Bridgesia spicata Hook. et Arn. **3,** 169.
Bryonia tenuifolia Gill. **3,** 323.
Bunchosia multiflora Hook. et Arn. **3,** 157.
Byttneria heterophylla Hook. **1,** 291.
Cadaba triphylla Wight, **3,** 296.
Caiophora coronata Hook. et Arn. **3,** 327 : *Loasa coronata* Gill. ex Arn.
Calandrinia andicola Gill. **3,** 332.
,, *capitata* Hook. et Arn. **3,** 334.
,, *Cumingii* Hook. et Arn. **3,** 334
,, *denticulata* Gill. **3,** 333.
,, *Gilliesii* Hook. et Arn. **3,** 333.
,, *ramosissima* Hook. et Arn. **3,** 334.
,, *sericea* Hook. et Arn. **3,** 334.
,, *trifida* Hook. et Arn. **3,** 333.

Camptosema Hook. et Arn. **3,** 200, gen. nov. (Leguminosae).
Camptosema rubicundum Hook. et Arn. **3,** 201.
Canavalia paranensis Hook. et Arn. **3,** 200.
Cardamine affinis Hook. et Arn. **3,** 137.
,, *angulata* Hook. **1,** 343.
,, *nivalis* Gill. ex Hook. **3,** 136.
Cardiospermum velutinum Hook. et Arn. **3,** 158.
Cassia Arnottiana Gill. **3,** 211.
,, *Cruckshanksii* Hook. et Arn. **3,** 210.
,, *Cumingii* Hook. et Arn. **3,** 211.
,, *Hookeriana* Gill. **3,** 210.

Castanospermum A. Cunn. **1,** 241, gen. nov. (Leguminosae).
Castanospermum australe A. Cunn. et Fraser, **1,** 241.
Castela Nicholsoni Hook. **1,** 271.
Celastrus rhombifolius Hook. et Arn. **3,** 171
Chenopodium paniculatum Hook. **2,** 237.
Cissus bonariensis Hook. et Arn. **3,** 159.
,, *deficiens* Hook. et Arn. **3,** 160.
,, *serratifolia* Rottl. ex Wight, **2,** 104.

Codonocarpus A. Cunn. ex Hook. **1,** 244, pro syn. : *Gyrostemon* Desf. (Phytolaccaceae).

Codonocarpus australis A. Cunn. **1,** 244.
Colletia cruciata Gill. et Hook. **1,** 152.
,, *ferox* Gill. et Hook. **1,** 154.
,, *longispina* Hook. et Arn. **3,** 173.
,, *ulicina* Gill. et Hook. **1,** 155.
Colliguaja integerrima Gill. et Hook. **1,** 140
,, *salicifolia* Gill. et Hook. **1,** 141.
,, *triquetra* Gill. et Hook. **1,** 142.
Colobanthus aretioides Gill. ex Hook. **3,** 336.
Cologania heterophylla Gill. ex Hook. **3,** 181.
Combretum Heynianum Wall. **3,** 86.
Convolvulus munitus Wall. **2,** 104.
Cornidia integerrima Hook. et Arn. **3,** 344
,, *serratifolia* Hook. et Arn. **3,** 344.
Corrigiola squamosa Hook. et Arn. **3,** 337.
Crantzia attenuata Hook. et Arn. **3,** 346.
Cremolobus linearifolius Hook. et Arn. **3,** 138.
Cristaria dissecta Hook. et Arn. **3,** 153.
,, *eriantha* Hook. et Arn. **3,** 152.
,, *heterophylla* Hook. et Arn. **3,** 153 : *Sida heterophyllla* Cav.
Crotalaria digitata Hook. **2,** 354.

Cruckshanksia Hook. **2,** 211, gen. nov. (Geraniaceae)—now reduced to *Balbisia* Cav. (1804)
Cruckshanksia cistiflora Hook. **2,** 211.

Cruckshanksia Hook. et Arn. **3,** 361, gen. nov. (Rubiaceae).
Cruckshanksia hymenodon Hook. et Arn. **3,** 361.

Cryptopetalum Hook. et. Arn. **3,** 344, gen. nov. (Saxifragaceae)—now reduced to *Lepuropetalon* Ell. (1817).
Cryptopetalum pusillum Hook. et Arn. **3,** 345.
Cucurbita asperata Gill. **3,** 324.
Cupania uraguensis Hook. et Arn. **3,** 159.
Cuphea glabra Gill. ex Hook. et Arn. **3,** 314.
Dalea cylindrica Hook. **2,** 213.
,, *elegans* Gill. ex Hook. **3,** 183.
Desmodium cuneatum Hook. et Arn. **3,** 195
,, *limense* Hook. **2,** 215.

Dipyrena Hook. **1,** 355 : *Wilsonia* Gill. et Hook. (1830), non R.Br. (1810).
Dipyrena glaberrima Hook. **1,** 355 : *Wilsonia glaberrima.*
Discaria Hook. **1,** 156, gen. nov. (Rhamnaceae).
Discaria americana Gill. ex Hook. **1,** 156.
,, *australis* Hook. **1,** 157, in adnot.: *Colletia pubescens* Brongn.
Draba Gilliesii Hook. et Arn. **3,** 137.
Dracocephalum erectum Royle ex Benth. **3,** 380.
Elatine ambigua Wight, **2,** 103.
Epilobium puberulum Hook. et Arn. **3,** 309.
Eremostachys superba Royle ex Benth. **3,** 381.

Erianthera Benth. **3,** 380, gen. nov. (Labiatae)—now reduced to *Lamium* L. (1753).
Erianthera rhomboidea Benth. **3,** 380.
Eryngium anomalum Hook. et Arn. **3,** 350.
,, *bupleuroides* Hook. et Arn. **3,** 352.
,, *coronatum* Hook. et Arn. **3,** 350.
,, *depressum* Hook. et Arn. **3,** 351.
,, *divaricatum* Hook. et Arn. **3,** 350.
,, *flaccidum* Hook. et Arn. **3,** 350.
,, *nudum* Gill. et Hook. **1,** 334.
,, *sarcophyllum* Hook. et Arn. **3,** 352.
Erysimum pusillum Gill. **3,** 140.
Escallonia Callcottiae Hook. et Arn. **3,** 342.
,, *Grahamiana* Gill. ex Hook. et Arn. **3,** 343.
,, *macrantha* Hook. et Arn. **3,** 341
Eugenia affinis Gill. **3,** 321.
,, *Bridgesii* Hook. et Arn. **3,** 322.
,, *correaefolia* Hook. et Arn. **3,** 319.
,, *Cruckshanksii* Hook. et Arn. **3,** 321.
,, *Cumingii* Hook. et Arn. **3,** 319.
,, *elliptica* Hook. et Arn. **3,** 323.
,, *ferruginea* Hook. et Arn. **3,** 319.
,, *Gilliesii* Hook. et Arn. **3,** 320.
,, *multiflora* Hook. et Arn. **3,** 322.
,, *ovata* Hook. et Arn. **3,** 319.
,, *planipes* Hook. et Arn. **3,** 323.
,, *Selkirkii* Hook. et Arn. **3,** 318.
,, *stenophylla* Hook. et Arn. **3,** 322.
,, *Tweediei* Hook. et Arn. **3,** 323.
,, *Ugni* Hook. et Arn. **3,** 318 : *Myrtus Ugni* Mol.
Fagonia chilensis Hook. et Arn. **3,** 165.
Galactia stenophylla Hook. et Arn. **3,** 182.
Galium Chamissonis Hook. et Arn. **3,** 363.
,, *Gilliesii* Hook. et Arn. **3,** 364.
,, *suffruticosum* Hook. et Arn. **3,** 363.
Gayophytum micranthum Hook. et Arn. **3,** 311 : *Oenothera micrantha* Presl.
Genista andicola Gill. ex Hook. et Arn. **3,** 178.
,, *Cumingii* Hook. et Arn. **3,** 178.
,, *elegans* Gill. ex Hook. et Arn. **3,** 178.
,, *rigida* Gill. ex Hook. et Arn. **3,** 178.
Gentiana incurva Hook. **2,** 228.
,, *thyrsoidea* Hook. **2,** 227.
Glycosmis triphylla Wight, **3,** 298.

Glycyrhiza astragalina Gill. **3**, 183.
Gongora macrantha Hook. **2**, 151.
Gouania ulmifolia Hook. et Arn. **3**, 174.

Gourliea Gill. ex Hook. **3**, 207, gen. nov. (Leguminosae).
Gourliea decorticans Gill. ex Hook. **3**, 208.

Grahamia Gill. apud Hook. et Arn. **3**, 331, gen. nov. (Portulacaceae).
Grahamia bracteata Gill. **3**, 332.

Guildingia Hook. **1**, 122, gen. nov. (Melastomataceae)—now reduced to *Mouriria* Juss. (1789) or to *Olisbea* DC. (1828).
Guildingia psidioides Hook. **1**, 122.

Guindilia Gill. ex Hook. et Arn. **3**, 170, gen. nov. (Rutaceae)—now reduced to *Valenzuelia* Bert. (Sapindaceae).
Guindilia trinervis Gill. **3**, 170.
Gyrostemon attenuatum Hook. **1**, 243, in adnot.
Hedyotis perpusilla Hook. et Arn. **3**, 359.
Herniaria setigera Gill. **3**, 337.
Heteropteris glabra Hook. et Arn. **3**, 157.

Hexaptera Hook. **1**, 350, gen. nov. (Cruciferae).
Hexaptera cuneata Gill. et Hook. **1**, 352.
,, *pinnatifida* Gill. et Hook. **1**, 350.
,, *spathulata* Gill. et Hook. **1**, 351.
Hibiscus angustifolius Hook. et Arn. **3**, 152.
Hoffmanseggia gracilis Hook. et Arn. **2**, 209.

Holboellia Wall. ex Hook. **2**, 144, gen, nov. (Gramineae)—now reduced to *Lopholepis* Decne. (1839).
Holboellia ornithocephala Hook. **2**, 144.

Homalocarpus Hook. et Arn. **3**, 348. gen. nov. (Umbelliferae)—now reduced to *Bowlesia* Ruiz et Pav. (1794).
Homalocarpus bowlesioides Hook. et Arn. **3**, 348.
Inga parvifolia Hook. et Arn. **3**, 202.
,, *uraguensis* Hook. et Arn. **3**, 202.
Ionidium diffusum Gill. ex Hook. **3**, 145.
Ipomoea punctata Macfad. **2**, 116.
Jaborosa caulescens Gill. et Hook. **1**, 347.
Jussieua bracteata Hook. et Arn. **3**, 313.
,, *hexapetala* Hook. et Arn. **3**, 312.
,, *multinervia* Hook. et Arn. **3**, 312.
,, *stenophylla* Gill. **3**, 312.
Lamium petiolatum Royle ex Benth. **3**, 381.
Lamourouxia bartsioides Hook. **2**, 234.

Laretia Gill. et Hook. **1**, 329, gen. nov. (Umbelliferae).
Laretia acaulis Gill. et Hook. **1**, 329.
Lathyrus crassipes Gill. ex Hook. et Arn. **3**, 198.
,, *macropus* Gill. ex Hook. et Arn. **3**, 198.
Lewisia rediviva Pursh var. β Hook. **1**, 345.
Limonia missionis Wall. **3**, 291.
Lithrea caustica Hook. et Arn. **3**, 175 : *Laurus caustica* Mol.
Loasa dissecta Hook. et Arn. **3**, 330.
,, *elongata* Hook. et Arn. **3**, 329.
,, *floribunda* Hook. et Arn. **3**, 329.
,, *heterophylla* Hook. et Arn. **3**, 328.
,, *sagittata* Hook. et Arn. **3**, 328.
Loranthus Berteroi Hook. et Arn. **3**, 357.
,, *uraguensis* Hook. et Arn. **3**, 358.
Lupinus albescens Hook. et Arn. **3**, 201.
,, *andicola* Gill. **3**, 201.
,, *aureo-nitens* Gill. **3**, 201.
Macraea crenata Hook. **1**, 177.
Malva geranioides Gill. ex Hook. **3**, 152.
,, *glomerata* Hook. et Arn. **3**, 151.
,, *humilis* Gill. **3**, 150.
,, *peduncularis* Hook. et Arn. **3**, 150.
,, *sulphurea* Gill. **3**, 149.
,, *tenuifolia* Hook. et Arn. **3**, 150.
Margyricarpus alatus Gill. ex Hook. et Arn. **3**, 305.

Marmoritis Benth. **3**, 377, gen. nov. (Labiatae)—now reduced to *Nepeta* L (1753).
Marmoritis rotundifolia Benth. **3**, 377.

Mathewsia Hook. et Arn. **3**, 140, gen. nov. (Cruciferae).
Mathewsia foliosa Hook. et Arn. **3**, 140.
Menyanthes Crista-Galli Menz. ex Hook. **1**, 45.
Microcarpaea spathulata Hook. **2**, 101 : *Limosella diandra* L.
Mimosa adpressa Hook. et Arn. **3**, 202.
,, *uraguensis* Hook. et Arn. **3**, 202.
Misodendron microphyllum Hook. et Arn. **3**, 357.
Momordica Hystrix Gill. **3**, 324.
Mucuna prurita Hook. **2**, 348.
Mulinum albovaginatum Gill. et Hook. **1**, 328.
,, *ulicinum* Gill. et Hook. **1**, 328.
Mutisia linifolia Hook. **1**, 12.
Myriophyllum proserpinacoides Gill. ex Hook. et Arn. **3**, 313.
Myrtus fernandeziana Hook. et Arn. **3**, 316.
,, *stipularis* Hook. et Arn. **3**, 316.
Nepeta clinopodioides Royle ex Benth. **3**, 379.

Nepeta connata Royle ex Benth. **3** 378.
,, *discolor* Royle ex Benth. **3**, 378.
,, *distans* Royle **3**, 379.
,, *elata* Royle ex Benth. **3**, 378.
,, *elliptica* Royle **3**, 378.
,, *linearis* Royle ex Benth. **3**, 377.
,, *nervosa* Royle ex Benth. **3**, 378.
,, *polystachya* Royle ex Benth. **3**, 378.
,, *salviaefolia* Royle ex Benth. **3**, 379.
Oenothera mendocinensis Gill. ex Hook. et Arn. **3**, 310.
Origanum laxiflorum Royle ex Benth. **3**, 376.
Orthosiphon pallidus Royle ex Benth. **3**, 370.
Oxalis adenophylla Gill. **3**, 165.
,, *andicola* Gill. **3**, 161.
,, *compacta* Gill. **3**, 162.
,, *erythrorhiza* Gill. **3**, 162.
,, *geminata* Hook. et Arn. **3**, 163.
,, *lineata* Gill. **3**, 162.
,, *macrorrhiza* Gill. **3**, 162.
,, *platypila* Gill. **3**, 163.
,, *subacaulis* Gill. **3**, 163.

Oxleya A. Cunn. **1**, 246, gen. nov. (Meliaceae)—now reduced to *Flindersia* R. Br. (1814).
Oxleya xanthoxyla A. Cunn. **1**, 246.
Panicum aristatum Macfad. **2**, 115.
Passiflora retusa Hook. et Arn. **3**, 325.
Pentacaena ramosissima Hook. et Arn. **3**, 338 : *Loeflingia ramosissima* Weinm.
Phaca Arnottiana Gill. **3**, 184.
,, *canescens* Hook. et Arn. **3**, 185.
,, *carinata* Hook. et Arn. **3**, 185.
,, *coquimbensis* Hook. et Arn. **3**, 184.
,, *Cruckshanksii* Hook. et Arn. **3**, 184.
,, *elata* Hook. et Arn. **3**, 185.
,, *flava* Hook. et Arn. **3**, 186.
,, *inflata* Gill. **3**, 183.
,, *ochroleuca* Hook. et Arn. **3**, 186.
Phaseolus amoenus Macfad. **2**, 113.
,, *vestitus* Hook. **2**, 216.
Phlomis bracteosa Royle ex Benth. **3**, 383.
,, *cashmeriana* Royle ex Benth. **3**, 382.
,, *cordata* Royle ex Benth. **3**, 382.
,, *lamiifolia* Royle ex Benth. **3**, 383.
,, *latifolia* Royle ex Benth. **3**, 383.
,, *simplex* Royle ex Benth. **3**, 382.
Plectrocarpa Gill. ex Hook. et Arn. **3**, 166, gen. nov. (Zygophyllaceae).
Plectrocarpa tetracantha Gill. **3**, 167.
Pleurophora polyandra Hook. et Arn. **3**, 315.
,, *pusilla* Hook. et Arn. **3**, 315.
Poinciana Gilliesii Hook. **1**, 129.
Polygala spinescens Gill. **3**, 146.
Portulaca pilosissima Hook. **2**, 220.
Prenanthes subdentata Hook. **2**, 221.
Prosopis astringens Gill. ex Hook. **3**, 204.
,, *ephedrioides* Gill. ex Hook. **3**, 204.
,, *globosa* Gill. ex Hook. **3**, 205.
,, *humilis* Gill. ex Hook. **3**, 204.
,, *sericantha* Gill. ex Hook. **3**, 204.
Psidium amygdalinum Hook. et Arn. **3**, 317.
Psoralea Higuerilla Gill. ex Hook. **3**, 181.
Psychotria pyrifolia Hook. et Arn. **3**, 360.
,, *trifolia* Hook. et Arn. **3**, 359.
Pyrenacantha volubilis Wight **2**, 107.
Ranunculus trisepalus Gill. ex Hook. **3**, 133.
Retanilla stricta Hook. et Arn. **3**, 173.
,, *trinervia* Hook. et Arn. **3**, 174 : *Trevoa trinervia* Gill. et Hook.
Rhexia heterophylla Hook. et Arn. **3**, 316.
Rhynchosia mendacinensis Gill. ex Hook. et Arn. **3**, 199.
,, *Senna* Gill. ex Hook. et Arn. **3**, 199.
,, *sericea* Gill. ex Hook. et Arn. **3**, 199.
Ribes cucullatum Hook. et Arn. **3**, 340.
Rubia Haenkeana Gill. ex Hook. et Arn. **3**, 363.
,, *intricata* Hook. et Arn. **3**, 362.
,, *mucronata* Hook. et Arn. **3**, 363 : *Galium mucronatum* Ruiz et Pav.
,, *pusilla* Gill. ex Hook. et Arn. **3**, 363.
,, *Richardiana* Gill. ex Hook. et Arn. **3**, 362.
Ruellia floribunda Hook. **2**, 236.
Sageretia trinervis Gill. ex Hook. **3**, 172.
Salvia hians Royle ex Benth. **3**, 373.
,, *strictiflora* Hook. **2**, 234.
Sarothra Drummondii Grev. et Hook. **3**, 236.
Schinus ternifolius Gill. ex Hook. **3**, 177.
Senecio volubilis Hook. **2**, 226.
Seseli Gilliesii Hook. et Arn. **3**, 354.
Sicyos Baderoa Hook. et Arn. **3**, 324.
Sida Arnottiana Gill. ex Hook. **3**, 154.
,, *ceratocarpa* Hook. et Arn. **3**, 154.
,, *densiflora* Hook. et Arn. **3**, 155.
,, *Grevilleana* Gill. ex Hook. **3**, 154.
,, *picta* Gill. ex Hook. **3**, 154.
Silene andicola Gill. **3**, 147.
Sisymbrium Arnottianum Gill. ex Hook. **3**, 138.
,, *frutescens* Gill. ex Hook. **3**, 139.
,, *leptocarpum* Hook. et Arn. **3**, 139.
,, *sagittatum* Hook. et Arn. **3**, 139.

Sisymbrium stenophyllum Gill. ex Hook. **3**, 139.
Solanum amblyophyllum Hook. **2**, 231.

Spathicarpa Hook. **2**, 146, gen. nov. (Araceae).
Spathicarpa hastifolia Hook. **2**, 147.
Stachys speciosa Hook. **2**, 235.
Stevia puberula Hook. **2**, 225.

Tetrastemon Hook. et Arn. **3**, 317, gen. nov. (Myrtaceae)—now reduced to *Myrrhinium* Schott. (1827).
Tetrastemon loranthoides Hook. et Arn. **3**, 318.
Teucrium nudicaule Hook. **2**, 235.
Thlaspi andicola Hook. et Arn. **3**, 138.

Trevoa Miers ex Hook. **1**, 158, gen. nov. (Rhamnaceae).
Trevoa quinquenervia Gill. et Hook. **1**, 158.
,, *trinervia* Gill. et Hook. **1**, 159.

Tricomaria Gill. ex Hook. **3**, 157, gen. nov. (Malpighiaceae).
Tricomaria Usillo Hook. et Arn. **3**, 158.
Trifolium Macraei Hook. et Arn. **3**, 179.
,, *microdon* Hook. et Arn. **3**, 180.
,, *physanthum* Hook. et Arn. **3**, 180.
Unxia dissecta Hook. **2**, 227.
Valeriana Bridgesii Hook. et Arn. **3**, 365.
Verbena aphylla Gill. et Hook. **1**, 161.
,, *asparagoides* Gill. et Hook. **1**, 165.
,, *aspera* Gill. et Hook. **1**, 163.
,, *caespitosa* Gill. et Hook. **1**, 165.
,, *crithmifolia* Gill. et Hook. **1**, 169.
,, *erinacea* Gill. et Hook. **1**, 164.
,, *flava* Gill. et Hook. **1**, 170.
,, *glauca* Gill. et Hook. **1**, 163.
,, *gratissima* Gill. et Hook. **1**, 160.
,, *intermedia* Gill. et Hook. **1**, 166.
,, *juncea* Gill. et Hook. **1**, 162.
,, *juniperina* Gill. et Hook. **1**, 163.
Verbena radicans Gill. et Hook. **1**, 170.
,, *scoparia* Gill. et Hook. **1**, 161.
,, *seriphioides* Gill. et Hook. **1**, 164.
,, *spathulata* Gill. et Hook. **1**, 162.
,, *teucrioides* Gill. et Hook. **1**, 167.
,, *venosa* Gill. et Hook. **1**, 167.
Vicia bidentata Hook. **2**, 215.
,, *bijuga* Gill. ex Hook. **3**, 197.
,, *dentata* Gill. ex Hook. **3**, 197.
,, *Macraei* Hook. et Arn. **3**, 195.
,, *micrantha* Hook. et Arn. **3**, 197 : *V. parviflora* Hook. et Arn.
,, *pallida* Hook. et Arn. **3**, 196.

Vincentia Boj. **1**, 293, gen. nov. (Tiliaceae)—either reduced to *Grewia* L. (1753) or replaced by *Vinticena* Steud.
Vincentia triflora Boj. **1**, 293.
Viola Asterias Hook. et Arn. **3**, 145.
,, *congesta* Gill. **3**, 144.
,, *pusilla* Hook. et Arn. **3**, 145.
,, *volcanica* Gill. **3**, 145.
Viscum ambiguum Hook. et Arn. **3**, 356.
,, *falcifrons* Hook. et Arn. **3**, 356.
,, *Liga* Gill. ex Hook. et Arn. **3**, 355.
Viviania crenata G. Don ex Hook. **3**, 149 : *Macraea crenata* Gill. et Hook.
,, *petiolata* Hook. et Arn. **3**, 149.
Vohiria aphylla Hook. **1**, 46 : *Gentiana aphylla* Jacq.
,, *tenella* Guild. ex Hook. **1**, 47.
Wiborgia oblongifolia Hook. **2**, 226.
Wilsonia Gill. et Hook. **1**, 172, gen. nov. (Verbenaceae), non R. Br. (1810) : renamed *Dipyrena* Hook. (1830), the generic name *Wilsonia* being preoccupied.
Wilsonia glaberrima Gill. et Hook. **1**, 173.
Witheringia salicifolia Hook. **2**, 231.
Zanthoxylon Coco Gill. ex Hook. et Arn. **3**, 168.
Zygophyllum Retama Gill. ex Hook. et Arn. **3**, 166.

The dates hitherto assigned, in all botanical works of reference, to the following generic names are erroneous, being in each case one year later than the actual date of publication :

Scouleria Hook. (Grimmiaceae), *Adenocaulon* Hook. (Compositae), *Bridgesia* Hook. et Arn. (" Rutaceae "), *Camptosema* Hook. et Arn. (Leguminosae), *Discaria* Hook. (Rhamnaceae), *Gourliea* Gill. ex Hook. (Leguminosae), *Guildingia* Hook. (Melastomataceae), *Guindilia*, Gill. (Sapindaceae), *Mathewsia* Hook. et Arn. (Cruciferae), *Plectrocarpa* Gill. ex Hook. et Arn. (Zygophyllaceae), *Tricomaria* Gill. ex Hook. (Malpighiaceae), *Wilsonia*, Gill. et Hook. (Verbenaceae).

The generic name *Trevoa* (Rhamnaceae), cited from Miers, Trav.

Chile, **2,** 529 (1826), appeared there as a nomen nudum. Actually the first description was published 3 years later by Hooker in Hook. Bot. Misc. **1,** 158 (September 1829).

Wight's " Illustrations of Indian Botany," which appeared in Hook. Bot. Misc. **2,** 90–110 (after 22 Oct., 1830), 344–360 (autumn ? 1831), **3,** 84–104 (spring ? 1832), 291–302 (1 March, 1833), was reprinted, under the same title, at Glasgow (Curll & Bell), the title-page bearing the date 1831. This date evidently refers only to the first part of the reprint, which must necessarily have appeared in instalments. In the Bradley Bibliography, **1,** 471, the date of the reprint is given as 1831 [–33]. The copy seen by Pritzel, Thesaurus, ed. 2, n. 10243 included pp. 1–70, tt. i–xix, xxi–xli, which originally appeared in the Botanical Miscellany during the period 1830–33. A copy, presented by George Bidie to Sir J. D. Hooker, and now in the Library of the Royal Botanic Gardens, Kew, ends with p. 58 and t. xxxii, the last instalment being missing. This shows that the title-page was issued before the completion of the reprint.

Advantage was taken, when reprinting, to adjust the text slightly. Thus the accounts of *Pterospermum suberifolium*, p. **45,** *Bryophyllum calycinum*, p. **55,** and *Butea frondosa*, p. **57,** begin at the top of the page, instead of some distance down as in the " Botanical Miscellany," while the description of *Villarsia macrophylla*, pp. 51–52, and the general remarks, pp. 53–54, are adjusted so that the former ends at the bottom of p. 52, and the latter begin at the top of p. 53.

The continuation of the " Illustrations of Indian Botany " published in Hook. Journ. Bot. **1,** 62–67, 225–231 (1834) does not appear to have been reprinted.

XII—THE FLORA OF THE PYRENEES ORIENTALES. NEW VARIETIES AND ADDITIONS. A. R. Horwood.

Amongst some plants collected in the Pyrénées Orientales by Mr. J. W. Wyatt, in the Vernet-les-bains district, between June and September, 1934, were two undescribed varieties, *Hypochoeris maculata* L. var. *runcinata* Horw., and *Hypericum montanum* L. var. *pilosum* Horw. Mr. Wyatt made his collection under difficulties, when only just recovering from an accident. It is therefore the more remarkable that he should have enriched the Kew Herbarium to the extent of over 350 specimens. Besides the new varieties here described, various other plants, rare or unknown in the Pyrénées Orientales, were found by Mr. Wyatt.

The following notes deal with variation in the two species concerned, and contain descriptions of the new varieties, followed by a list of other interesting plants found.

The typical leaf form of *Hypochoeris maculata*, as described by Linnaeus, Sp. Pl. 810, is not lobed, but merely toothed, the original description being " Hypochaeris caule subnudo : ramo solitario foliis ovato-oblongis integris dentatis." Over wide areas this type is the usual one, and in Rouy et Foucaud, Flore de France, **10,** 38 (1908), no variety is mentioned ; but in montane and rocky areas there is considerable variation.

I. *Varieties based upon foliage characters.*

1. var. **pinnatifida** (*Uechtr.*) *Weiss* in Koch, Syn. Deutsch. Fl. ed. 3 (Hallier uu. Wohlfarth), fasc. 11, 1623 (1900) ; F. N. Williams, Prodr. Fl. Brit. part 4, 187 (1903) ; Hegi, Ill. Fl. **6,** pt. 2, 1010 (1928). —*Achyrophorus maculatus* (L.) Scop. var. *pinnatifidus* Uechtr. in Fiek, Fl. Schlesien, 252 (1881).

2. var. **oblongifolia** (*DC.*) *K. Maly* in Glasnik Zemaljsk. Muz. u. Bosni i Hercegov. **11,** 147 (1899) ; Schinz et Thell. Fl. Schweiz, ed. 3, **2,** 355 (1914) ; Hegi, l.c.—*Achyrophorus maculatus* (L.) Scop. var. *oblongifolius* DC. in DC. Prodr. **7,** 93 (1838). *A. maculatus* var. *longifolius* G. Froel. ex Hegi, l.c. *Hypochoeris tyrolensis* Schiw. ex DC., l.c. *H. maculata* forma *tirolensis* (Schiw.) Fiori, Fl. Anal. Ital. **3,** 392 (1904).

3. var. **phyllocaulos** *Metsch,* Fl. Henneb. 317 (1845) ; et in Bot. Zeit. **10,** 290 (1852) ; Hegi, l.c.

4. var. **Pelivanovicii** (*Petrov.*) *Horw.,* comb. nov.—*Hypochoeris Pelivanovicii* Petrov. ex Velen. Fl. Bulgar. 361 (1891). *H. Pelivanovicii* var. *typica* K. Maly in Glasnik Zemaljsk. Muz. u. Bosni i Hercegov. **35,** 135 (1923). *Hypochoeris maculata* subsp. *Pelivanovicii* (Petrov.) Hayek, Prodr. Fl. Penins. Balcan. **2,** 809 (1931). *Hypochoeris macedonica* Form. in Verh. Nat. Ver. Brunn, **37,** 159 (1898).

5. var. **illyrica** (*K. Maly*) *Hayek,* Prodr. Fl. Penins. Balcan. **2,** 809 (1931).—*Hypochoeris illyrica* K. Maly, in Glasnik Zemaljsk. Muz. u. Bosni i Hercegov. **18,** 447 (1906) ; Fedde, Repert. **6,** 293 (1909). *Hypochoeris Pelivanovicii* var. *illyrica* K. Maly, l.c. **35,** 135 (1923).

6. var. **koritnicensis** *Dörfl. et Hayek* in Osterr. Bot. Zeitschr. **70,** 22 (1921).

7. var. **alpicola*** (*Schur*) *Horw.,* comb. nov.—*Achyrophorus maculatus* var. *alpicola* Schur, Enum. Pl. Transs. 365 (1866).

8. var. **alpestris** (*Schur*) *Horw.,* comb. nov.—*Achyrophorus maculatus* var. *alpestris* Schur, l.c.

* Represented in Kew Herbarium.

9. var. **obtusifolia** (*Schur*) *Horw.*, comb. nov. *Achyrophorus maculatus* var. *obtusifolius* Schur, l.c.

10. var. **ramosissima** (*Schur*) *Horw.*, comb. nov. *Achyrophorus maculatus* var. *ramosissimus* Schur, l.c.

II. *Varieties based upon characters of the Capitula.*

11. var. **citrina*** *K. Maly* in Glasnik Zelmajsk. Muz. u. Bosni i Hercegov. **45,** 102 (1933).

12. var. **uniflora*** *DC.* Fl. Franc. **6,** 451 (1815).—*Hypochoeris maculata* var. *simplex* Duby in DC. Bot. Gall. ed. 2, **1,** 306 (1828). *Achyrophorus maculatus* (L.) Scop. var. *monocephalus* DC. in DC. Prodr. **7,** 93 (1838). *Hypochoeris maculata* forma *monocephala** (DC.) Fiori, Fl. Anal. Ital. **3,** 392 (1904).

13. var. **microcephala** (*DC.*) *Horw.*, comb. nov.—*Achyrophorus maculatus* var. *microcephalus* DC. in DC. Prodr. **7,** 93 (1838).

III. *Varieties based upon size.*

14. var. **fallax*** *Murr ex Hegi*, l.c.

The following is a description of the new variety :—
Hypochoeris maculata L. var. **runcinata** Horw., var. nov.; a typo habitu elatiore, caulibus altioribus ad 55 cm. altis ramosis, foliis longioribus ovatis vel lanceolatis runcinato-lobatis, scapo (in typo) ramoso 2–3-cephalo, flosculis citrino-luteis nec fuscis differt.

Pyrénées Orientales. Vernet-les-bains, 660 m., on a dry slope towards Fillols, 4.vi.1925, *Ellman & Sandwith* 43 (type) ; Py, 990 m., 25.vii.1934, *Wyatt* 224 ; Mont Louis, 17.viii.1934, *Wyatt* 198.

Great Britain. Orme's Head, Caernarvonshire, July 1886, *Dr. Wood* ; Lizard Head, Cornwall, 1890, *Fras. Jose.*

Styria. *R. C. Prior*, sine num.

The specimens collected at Vernet-les-bains (*Ellman & Sandwith* 43) in 1925 have typically runcinate leaves, as in many species of *Hieracium*. Those from Py (*Wyatt* 224) resemble *H. radicata* very closely in the marginal cutting of the leaves and in the size and habit, and it might be considered that *H. maculata* at that locality was tending towards *H. radicata*. There is, however, a difference in the capitula, bringing *H. maculata* into a separate section, *Achyrophorus*, with the pappus of the ray in one series, whereas in *Eu-Hypochoeris*, including *H. radicata*, the pappus in the ray is in two series, with the inner series setiform, not all plumose as in *H. maculata*. British specimens from Orme's Head, collected July 1856 by Dr. Wood, and at the Lizard, Cornwall, collected in 1890 by Fras. Jose, also come under this variety. A separate note will be published

* Represented in Kew Herbarium.

on these plants elsewhere. A specimen from Boschetto, Trieste, collected 28.v.1864 by M. Trihoda, approaches this variety.

The affinity of this variety lies no doubt with var. *pinnatifida* Uechtr., but in this, as described by Weiss, in Koch, loc. cit., the basal leaves are pinnatifid, with linear-lanceolate sections or lobes. A figure of this variety, in Fl. Danica, t.901 (1787), named "*Leontodon hirtum* Linn." by Müller, which is not based on either living or dried material seen by Vahl, is referred by Lange, Haandb. Dansk. Fl. ed. 3, 584 (1864), to *Hypochoeris maculata* var. *Muelleri*. This is treated as a synonym of var. *pinnatifida* by F. N. Williams, Prodr. Fl. Brit. **3,** 187 (1902), and included as a British plant, but he cites no locality. He describes the leaves of *H. radicata* erroneously as "sinuato-pinnatifida" (ibid. 186).

The other variety related to var. *runcinata* is Schur's var. *ramosissima*, Enum. Pl. Transs. 365 (1866), in which the leaves are described as "inciso-dentatis vel laceris," the rest of the description not agreeing, however, with the characters of var. *runcinata*.

Variation in Hypericum montanum

In Europe, according to C. E. Britton, in Journ. Bot. 1926, 325, the common form of this species is var. *scabrum* Koch, with the leaves "scurfy beneath."

The varieties described by Hegi, Ill. Fl. **5,** 525 (1825), include :—

var. *typicum* Beck (*H. elegantissimum* Crantz) with smooth foliage leaves, and forma *abbreviata* Reinecke, with the upper stem leaves broad, blunt-pointed.

var. *scabrum* Koch (var. *scaberulum* Beck), leaves scabrous beneath ;

var. *caucasicum* Parl., leaves without perforations or glands ;

var. *maculantherum* Sagorski, more glandular above.

De Candolle described a var. *triphyllum* with leaves in threes, not in pairs.

Rouy and Foucaud, Fl. de France, **3,** 341 (1895), mention var. *typicum* Beck, and var. *scabrum* Koch, as found in France, while Fournier (Fl. Compl. Plaine Franc. 65, in adnot.) regards the former as the typical French form.

In none of the above varieties is the stem anything but glabrous and the leaves are either glabrous, glaucous or scabrous.

Mr. Wyatt collected in the Pyrénées Orientales a plant quite distinct from any of the above, and I here describe it as a new variety. Besides the Pyrenean specimen of this variety there are examples agreeing with it from Sweden and Germany. In both Swedish and German specimens the leaves are without marginal black glands, as in the Pyrenean example.

Hypericum montanum *L.* var. **pilosum** *Horw.*, var. nov.; planta omnibus partibus minore, caulibus gracilioribus pilosis, foliis utrinque

pilosis nec scabris tenuioribus ovato-lanceolatis, subtus vix glaucis margine non atroglandulosis, floribus paucioribus a typo differt.

Pyrénées Orientales. Vernet-les-bains, 900 m., 26.vii.1934, *Wyatt* 23 (type) (with var. *scabrum* Koch).

Sweden. Kullanberg, July 1869, "rare," *F. Ahlberg.*

Germany. In mountain woods, Hercynia, Alti Stelberg, 18.vii.1882, *Beck* (with var. *scabrum* Koch).

Plants Rare or Previously Unnoticed

Besides the above new varieties, Mr. Wyatt collected a plant unrepresented in the Kew Herbarium. It has been identified by description as follows :—

Onopordon Gautieri Rouy. apud Gautier in Bull. Soc. Bot. Fr. **38,** sess. extr. p. xvi (1891), where it is recorded from Millas, collected by Gaston Gautier, 27 June, 1891. Rouy remarks that it is related only to *O. illyricum* L., or, in its form, to *O. horridum* Viv. Gautier in his herbarium had it under the name *O. nervosum*, but that name was preoccupied by a Spanish plant. Rouy says it is distinguished from the above species by the narrow involucral bracts of the smaller heads, the lower bracts erect, carinate, and the pappus twice as long as the cypselae.

Rouy suggested (l.c. 17) that this species might be found at Vernet-les-bains, where Mr. Wyatt collected it, in Aug. 1934 (no. 30), thus confirming Rouy's prediction. It grew at 810 m., only in one place, but was there plentiful.

The following species or varieties are not recorded by Gaston Gautier in his "Catalogue Raisonné de la Flore des Pyrénées-Orientales," 1898, though all but the three immediately following are recorded for France as a whole by Rouy and Foucaud.

Aster alpinus L. var. *Flahaulti* Sennen.—Canigou, 2400 m., 6.viii.1934, *Wyatt* no. 258.

Artemisia scoparia WK.—Vernet-les-bains, 690 m., 1.ix.1934, no. 331, doubtless an alien.

Knautia purpurea Vill.—Marialles, 1650 m., apparently an entire-leaved form of this, 15.viii.1934, no. 294.

Potentilla argentea L. var. *multifida* Tratt. (var. *tenuiloba* Jord.).—St. Martin, Vernet, 1050 m., 2.vii.1934, no. 48.

Epilobium hirsutum L. var. *villosissimum* Koch.—Villefranche, 450 m., 15.viii.1934, no. 286.

Senecio adonidifolius Lois, var. *platylobus* R. et F.—Canigou, 1200 m., 1.vii.1934, no. 27a.

Hieracium umbellatum L., subsp. *serotinum* Host.—Vernet-les-bains, 690 m., 23.viii.1934, no. 314.

Hieracium Pilosella L. subsp. *velutinum* Heg. et Her.—Vernet-les-bains, 750 m., 30.vi.1934, no. 29 ; ibid. 900 m., 5.vii.1934, no. 78.

Lactuca dubia Jord. (*L. Scariola*, L., entire-leaved form).—Vernet-les-bains, 750 m., 21.viii.1934, no. 312.

Linaria alpina L. var. *unicolor* Gremli.—Canigou, 10.vii.1934, no. 142.

Veronica officinalis L. var. *Tournefortii* Reichb.—Glandular form, Mariailles, 1500 m., 15.viii.1934, no. 308.

Euphrasia Willkommii Freyn. — Vernet-les-bains, 810 m., 15.ix. 1934, no. 351 ; Mariailles, 1050 m., 15.viii.1934, no. 304.

Lavandula officinalis Chaix var. *pyrenaica* (DC.) Benth.—Tour de Goa, 1230 m., 15.vii.1934, no. 171 ; Villefranche, 435 m., 27.vii. 1934, no. 235.

Lamium maculatum L. var. *rugosum* (Ait.) Briq.—Vernet-les-bains, 750 m., 30.vi.1934, no. 2.

Teucrium aureum Schreb., var. *latifolium* Willk.—Vernet-les-bains, 900 m., 5.vii.1934, no. 82.

XIII—ON THE FLORA OF THE NEARER EAST: XVII.*

New Plants and New Records. W. B. Turrill.

Arenaria Teddii *Turrill*, sp. nov.; ab *A. murale* Sieb. foliis superioribus latissime ovatis, bracteis foliaceis conspicue differt.

Herba ramosissima, caulibus teretibus tenuibus densissime glanduloso-hispidulis. *Folia* elliptica (suprema excepta), apice acuta, basi angustata, sessilia, vel breviter petiolata, usque ad 9 mm. longa et 4 mm. lata, costa nervis lateralibusque supra obscuris infra leviter prominentibus, pagina utraque glanduloso-hispidula, suprema late ovata vel fere orbicularia et gradatim minora, sessilia. *Inflorescentia* pauciflora, ramosa, ramis tenuibus, glanduloso-hispidulis, internodiis usque ad 3 cm. longis, pedicellis 2 cm. longis vel saepissime brevioribus ; bracteae late ovatae, omnes foliaceae. *Sepala* acutissima vel breviter acuminata, 2·5 mm. longa, exteriora lanceolato-ovata 1·5 mm. lata, interiora lanceolato-oblonga 1 mm. lata, viridia, membranaceo-marginata (interiora praecipue), dorso hispidulo-glandulosa, leviter carinata, nervis lateralibus utrinque 2 inconspicuis. *Petala* alba, elongato-obovata, 4 mm. longa, 2 mm. lata, apice plus minusve rotundata, integra (vel interdum fortasse leviter emarginata vel brevissime denticulata), tenuissime trinervia. *Filamenta* usque ad 4 mm. longa, glabra ; antherae dehiscentes 0·6 mm. longae. *Ovarium* obloideum, tri- (rarissime bi-) sulcatum, 0·5–0·75 m. altum, 1–1·25 mm. diametro; styli 3 (rarissime 2), omnino liberi, usque ad 1·75 mm. longi. *Capsulae* valvae 3 mm. longae, apice acutae obtusae vel leviter truncatae, patentes vix recurvae. *Semina* ambitu fere hemisphaerica, 1 mm. longa, nigra, semituberculata dorso praecipue.

S. Macedonia: Mt. Pangaion (south side), 5.10.1933, rock crevices, dry place overhung by lofty rock, 680 m., *Tedd* 1249.

An account of *Arenaria oxypetala* S. et S. and allied species (included *A. muralis* Sieb.) was published in the Kew Bulletin,

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* Continued from K.B., 1935, 35.

1932, 450. It was there shown that in the countries around the Aegean Sea there occur a number of microspecies occupying more or less distinct geographical areas. The plant described above as *A. Teddii* is yet another of this plexus, but from an area farther to the north than *A. oxypetala* and the other species already considered. One other species needs mention in connection with *A. Teddii*, namely *A. graeca* (Boiss.) Hal. Consp. Flor. Graec. **1,** 232 (1900). This is known from various mountains in Greece, " in rupibus regionis abietinae et superioris." It is distinguished morphologically from *A. Teddii* very readily by its larger flowers.

Nadji (Charrel) in Empire Ottoman Géogr. Bot. 13 (1892) lists " *Arenaria graveolens* Schreb. varietas Pangea Mihi. Pernardaghe 1500 m." In Oesterr. Bot. Zeitschr. **42,** 272 (1892) what is probably the same plant is given as " *Arenaria nervosa* Halácsy et Charrel, species vel varietas *A. graveolentis* Schreber, foliis subtus bene trinerviis. Pournar daghe. Studio digna." Hayek, Prodr. Flor. Penins. Balc. **1,** 194 (1924) reduces *A. nervosa* Hal. et Charr. to *A. filicaulis* Fzl. in Griseb. Spic. **1,** 203 (1843). This latter, described from material collected " in regione montana m. *Athûs*," is however distinct from *A. Teddii* in a number of characters including the shape of the leaves, especially the upper leaves and lower bracts and the size of the flowers (type and other material at Kew). It is obviously impossible to identify *A. nervosa* from the meagre published data, but if Hayek be right in his reduction then *A. Teddii* is a very distinct plant from that collected by Nadji Effendi.

Holosteum umbellatum *L.* var. **tenerrimum** (*Boiss.*) Gay in Anns. Sci. Nat. 3ème Sér. **4,** 35 (1845). *H. tenerrimum* Boiss. Diagn. **1,** i. 53 (1842).

W. Thrace : Macasclar, 20.4.1930, 250 m., grassy places among dry rocks, brushwood, etc., *Tedd.* 212. The plant secretes a sticky substance. Karpouz Tepé, 25.5.1933, 610 m., rocky slopes and among bushes, *Tedd* 1074. Flowers white.

This variety (or species) is known from various localities in western Asia Minor. Its chief characteristic is the large size of the petals which are up to 15 or 16 mm. long and project 8 or 9 mm. beyond the sepals. So far as is known it has not previously been recorded in print from Europe. It seems probable that *Holosteum praeumbellatum* Candargy in Bull. Soc. Bot. Fr. **44,** 156 (1897), published with a most inadequate description of one and a half lines only, from Lesbos, is this plant. *H. macropetalum* Hausskn. et Bornm., Mitt. Bot. Ver. Jena **9,** 15 (1891) is also either the same or very closely related.

The Thracian material has rather larger petals than are to be found in Boissier's material at Kew. Also Tedd (for No. 1074) records the flowers (petals) as white, while Boissier says the petals are " pallide roseis," a statement which is repeated by Gay. No other information is available as to petal colour in the variety.

The petals are distinctly, though not densely, ciliated at the base. There are ten stamens in a flower, all bearing well-developed fully polliniferous anthers.

Silene dichotoma *Ehrh.* var. **glabra** *Turrill*, var nov., a planta typica omnibus partibus glabris differt.

Planta annua, caulibus erectis floriferis 5 praedita, omnino glabra. *Caules* erecti, teretes, usque ad 4·5 dm. alti, purpurei (inferne praecipue). *Folia caulina* lineari-elliptica vel superiora fere linearia, acuta, inferne angustata, usque ad 4 cm. longa et 5 mm. lata sed saepissime 1–3 mm. latis, vaginis 0·5–2 mm. longis vel (in foliis superioribus) nullis. *Inflorescentia* paullum ramosa ; bracteae ovatae, membranaceae vel late membranaceo-marginatae *Calyx* 11 mm. longus, dentibus triangularibus 2 mm. longis inclusis, glaberrimus. *Petala* 1·5 cm. longa, biloba, lobis 4·5 mm. longis, 2·5 mm. latis, coronis squamis 0·5 mm. longis. *Antherae* 2·5 mm. longae.

W. Thrace : Porto Lagos, 23.5.1930, sandy places near the coast, *Tedd* 336.

Silene dichotoma was described by Ehrhart in his Beitr. **7,** 143 (1792). The country of origin is given as Hungary with a question mark. In 1824 *S. racemosa* Otth. was described in DC Prodr. **1,** 384, based on *S. divaricata* S. et S. Fl. Graec. Prodr. **1,** 293 (1806) and Fl. Graec. t. 414 (1825) with the type collected " in agro Cariensi." *S. Sibthorpiana* Reichb. Flor. Germ. Excurs. 815 (1832) was based on *S. dichotoma* of the Fl. Graec. t. 413 (1825), in which the distribution was given as " in insulâ Cretâ, et circa montem Olympum Bithynum ; etiam, ni fallor, prope Thessalonicam." With the knowledge now obtained, in part from breeding work in other species of the genus, there can be little doubt that *S. dichotoma*, *S. racemosa*, and *S. Sibthorpiana* represent variations within one species. The degree of dichotomous branching (the supposedly chief difference between *S. dichotoma* and *S. racemosa*) appears to depend largely on environmental conditions. The presence or absence, or more accurately the degree of development, of the corona, has possibly some taxonomic importance. Even this character however, we know is not " constant " in other species of the genus.

Accepting then *Silene dichotoma* Ehrh. in a broad sense we have to reckon with a highly polymorphic species and it is doubtful how far the variations represent either real intraspecific entities or combinations of interchangeable and interchanging genes. Only much fuller field observations and experimental work can give a stable basis of fact for permanent classification. Tentatively Tedd's No. 336 is considered a variety characterized by being glabrous in all its vegetative and floral parts. There are no similar specimens among the fairly rich material of the species at Kew nor has any record been traced in literature. It is interesting to note that *Silene graeca* Boiss. et Sprun., a species usually regarded as

closely allied, is altogether glabrous. This species has, however, good differential characters, *inter alia*, in the leaf shape and the calyx teeth.

Other material at Kew of *S. dichotoma* from W. Thrace includes : Xanthie (Soune Mahalla), 60 m., dry stony or sandy soil of neglected terraces, 20.5.30, *Tedd.* 310. Hairy in all parts, with especially long, crisped, and almost bristly hairs on the calyx nerves.

Porto Lagos, sandy places near coast, 23.5.30, *Tedd.* 335. Hairy in all parts.

Near Phanar, sandy places near shore, forming an association with *Scirpus Holoschoenus*, 18.6.33, *Tedd* 1078. Hairy in all parts.

Xanthie, 210 m., among rocks and bushes of lower slopes of hills, 10.5.34, *Tedd* 1381. Plant hairy all over and especially with long hairs on the the calyx. The inflorescence is several times branched and the plant is, in this respect, to be placed as " var. *racemosa*."

Euphorbia cernua *Coss et Dur.* ex Boiss. in DC. Prodr. **15, 2,** 138 (1862).

S. Macedonia : Krystallopegae (Smrdesh), 21.6.32, c. 1080 m. shady places round bushes on dry slopes on south side of valley towards Breznitsa, *Alston and Sandwith* 954.

This species was originally described from material collected by Cosson " in Algeriae montibus Jurjura prope Dra el Mirzan." It has since been recorded from various localities in Algeria. It is further interesting to note that more recently it has been found in Italy (see Trotter in Nuov. Giorn. Bot. Ital. N.S. **34,** 1065 : 1928, and the earlier references given there). Probably the inconspicuous common weed-like appearance, which closely resembles that of several other species, notably *E. Peplus*, has led to its not being collected. It may have a wider and more continuous distribution than is at present known.

The Macedonian specimens agree well with authenticated, probably type, material from Algeria except that the seeds are, on the average, slightly smaller. This may be due to the plants being collected before the seeds were fully ripe.

The above identification was first made by Mr. N. Y. Sandwith.

XIV—ON THE SYSTEMATIC POSITION OF THE GENUS DOLIANTHUS C. H. WRIGHT.

C. E. B. Bremekamp.

Dr. C. van Steenis of the Buitenzorg Herbarium drew my attention to the monotypic genus *Dolianthus* C. H. Wright, of which he had seen the type specimen in the collection at Kew. The plant had struck him because it looked more like a member of the *Rubiaceae* than of the *Loganiaceae*, the family to which it had been referred by its author. When, by the courtesy of the

Director, I had an opportunity to study the material, I soon came to the conclusion that Dr. van Steenis was right. It is very probable that, originally, Wright also regarded the plant as belonging to the *Rubiaceae*, for his description of the genus (Kew Bull. 1899, 106) begins with the remark "*Hymenocnemidi* Hook. f. proximus"; and this genus *Hymenocnemis* has always been considered to belong to the *Rubiaceae*. It was probably the position of the ovary, which he described as superior, that induced him to refer the plant to the *Loganiaceae*. From the other genera of this family, however, it differs conspicuously in the shape and size of its rather large, interpetiolar stipules and in its uni-ovular ovary cells. These points alone are of sufficient importance to justify doubting the correctness of Wright's classification. There is, moreover, some reason to distrust his statement that the ovary is superior, as in the genera which, in my opinion, are its nearest allies the disc is as a rule very large, sometimes even larger than the ovary itself (compare, for instance, the figure in Hooker's "Icones Plantarum," t. 2810, of *Neo-Schimpera heterophylla* Hemsl., which its author afterwards reduced to *Amaracarpus pubescens* Bl.). It is not improbable, therefore, that what Wright regarded as the ovary was in reality mostly disc. As the type specimen possesses but a single intact flower, which of course could not be sacrificed, and as from the flower dissected by Wright the ovary has not been preserved, I was unable to get to the bottom of this question. The shape of the calyx and the insertion of the corolla, however, make it very probable that my interpretation is correct, and that the plant, therefore, belongs to the *Rubiaceae*.

The question which we shall have to solve next is the position which is to be assigned to the genus in the *Rubiaceae*, but before entering into a discussion of this point we shall have to examine in some detail the description given by Wright. It reads as follows:

> "*Dolianthus* C. H. Wright (gen. nov.): *Hymenocnemidi* Hook.f. proximus. Flores axillares, solitarii. Calyx aequaliter 4-lobatus, sine dentibus intermediis. Corollae tubus infundibuliformis; lobi 4 valvati. Stamina 4 ad corollae faucem subsessilia. Ovarium superius, 2-loculare; stylus filiformis, stigma incrassatum, minute 2-lobatum; ovula solitaria, erecta. Arbuscula habitu Coprosmae, foliis coriaceis."

The description of the flowers as axillary is obviously a mistake: they are terminal, and the rather characteristic pseudo-dichotomous type of branching owes its origin to this peculiarity. The flower which Wright dissected and of which calyx and corolla are still preserved was 4-merous; the flower which he left intact, however, is 5-merous. The stamens are inserted somewhat above the middle of the tube, not in the throat, and their filaments are slightly longer than the anthers. The latter are dorsifixed and obtusely bilobate

at the base, not sagittate, as Wright describes them in his diagnosis of the species.

The following description corrects these inaccuracies and gives moreover information with regard to a few points to which Wright paid no attention.

Dolianthus C. H. Wright, gen. nov. *Rubiacearum Psychotriearum*, generi *Amaracarpo* Bl. valde affinis.

Arbuscula ramosior, ramis dichasialiter dispositis, novellis pilis rufis fortioribus sparse vestitis, foliis coriaceis, parvis, decussatis et quadrifariam patentibus, stipulis interpetiolaribus, simplicibus, deciduis. Flores ramos ordinares terminantes, solitarii, pedicellati, ebracteolati, 4–5-meri. Ovarium probabiliter inferius, 2-loculare, ovulis solitariis, erectis. Calyx lobatus ; lobi triangulares. Corollae tubus infundibuliformis ; lobi oblongi, crassiusculi, intus papillosi, tubo breviores. Stamina paulo supra medium tubi inserta, filamentis brevibus, antheris subinclusis, dorsifixis, basi obtuse bilobatis, introrsis, longitudinaliter dehiscentibus. Discus probabiliter crassus ; stylus filiformis, paulo supra faucem exsertus ; stigma incrassatum, minute bilobatum. Fructus ignotus.

Species unica : *D. vaccinioides* C. H. Wright ; Nova Guinea, Mt. Scratchley, alt. 1000–1300 ft.

The uni-ovular ovary cells, the erect ovules, the valvate aestivation of the corolla lobes, the insertion of the stamens in the upper half of the corolla tube and the short stigma lobes all point in the direction of the *Psychotrieae*. In this tribe there are a few genera in which the flowers are either solitary or arranged in few-flowered inflorescences, and in which the ovary at the same time is two-celled, and it is in this group that we shall have to find a place for the genus *Polianthus*. It comprises : *Hymenocnemis* Hook.f. (the genus to which reference was made already by Wright in his diagnosis), *Saprosma* Bl., *Saldinia* A. Rich., *Margaritopsis* Sauv. and *Amaracarpus* Bl. The inflorescences in these genera are, as a rule, axillary. In *Amaracarpus*, however, they are terminal. This genus resembles *Dolianthus* moreover in the smallness of its leaves and in the presence of the same king of rather thick, rufous hairs on the young shoots. Its flowers, on the other hand, are much smaller, and there is moreover a considerable difference in habit. In *Amaracarpus*, in the same way as in some species of *Phyllanthus*, the main branches resemble bipinnate leaves, the branchlets and the leaves being arranged in the same more or less horizontal plane ; in *Dolianthus* however, as we have seen already, the ramification is a kind of pseudo-dichotomy, and the branchlets and leaves point in all directions.

XV—TWO NEW ARUNDINARIAS FROM YUNNAN.

Y. L. Keng.

Arundinaria Forrestii *Keng*, sp. nov.; verosimiliter affinis *A. melanostachyi* Hand.-Mazz., a qua ramulis floriferis e quoque nodo fasciculatis, racemis 3–4-spiculatis, spiculis minoribus differt.

Culmi 1·2–2·4 m. alti (teste *Forrest*), internodiis primariis 7–9 cm. longis et 3–4 mm. crassis, ceteris ignotis; ramuli foliiferi ignoti, floriferi dense fasciculati. *Vaginae* infra racemum plerumque 3–5, 2–3 cm. longae, imbricatae, striatae, glabrae vel margine ciliolatae. *Racemi* saepissime 3–4-spiculatae, basi inclusi vel breviter exserti, pedicellis tenuibus laevibus 3–9 mm. vel terminalibus usque 15 mm. longis. *Spiculae* 5–9-florae, 3–4·8 cm. longae, maturitate purpurascentes, rhachillae articulis 5–6 mm. longis tenuibus dorso puberulis margine et apice distincte ciliatis. *Glumae* 2, acuminatae, glabrae, prima 4–7 mm., secunda 8–13 mm. longa. *Lemmata* acuminata vel cuspidata, omnino puberula, primo 15–17 mm. longo 7-nervi. *Palea* 12–13 mm. longa, bidentulata, carinis superne ciliatis. *Antherae* 7–8 mm. longae. *Stigmata* 2–3, circiter 3 mm. longa.

Yunnan: bamboo brakes on the Mekong-Salwin divide, lat. 28° 12′ N., 3000 m., July 1917, *Forrest* 14127 (Herb. Kew.).

This species is probably related to *A. melanostachys* Hand.-Mazz., from which it differs, however, in having floriferous branches fasciculate at each node, 3–4-spiculate racemes, and smaller spikelets.

Arundinaria acutissima *Keng*, sp. nov.; *A. Forrestii* Keng supra descriptae affinis, habitu graciliore, ramulis floriferis multinodibus, glumis longioribus cuspidatis, antheris brevioribus distincta.

Culmi 0·6–2·4 m. alti (teste *Forrest*), internodiis primariis 4–8 cm. longis et 1·5–2 mm. crassis, ceteris ignotis; ramuli foliiferi pauci, cum ramulis floriferis intermixti, 2·5–4 cm. longi, vaginis 4–5 imbricatis inclusi; vaginae apice laminam usque 3·5 cm. longam et 4·5 mm. latam gerentes; ramuli floriferi fasciculati, primarii ramulosi, ramulo ultimo tenuissimo multinodi plerumque inferne nudo cum internodiis 1·5–2 mm. longis, vaginis compluribus 1·5–2 cm. longis imbricatis superne incluso. *Racemi* inferne inclusi, plerumque 3–4-spiculati, pedicellis tenuibus laevibus 6–20 mm. longis. *Spiculae* 4–6-florae, 2·5–3·5 cm. longae, maturitate purpurascentes, rhachillae articulis tenuibus 5–6 mm. longis albo-puberulis apicem versus ciliolatis. *Glumae* 2, cuspidatae, glabrae (apicem versus interdum scaberulae), 3–5-nerves, prima 8–11 mm., secunda 11–14 mm. longa. *Lemmata* cuspidata, 7-nervia, laevia vel secundum nervos saepe ciliolato-scaberula (inter nervos item saepe adpresso-puberula), primo 15–17 mm. longo, callo pilis albis circiter 0·8 mm. longis pubescente. *Palea* tenuis, circiter 1 cm. longa, bidentata, secundum carinas superne rigide ciliata, dorso glabra, carinis circiter 1 mm. remotis. *Antherae* circiter 5 mm. longae. *Stigmata* 3, circiter 2 mm. longa (immatura).

YUNNAN : N'Maikha-Salwin divide, lat. 26° 20′ N., 3000 m., in thickets, June, 1919, *Forrest* 18074 (typus, Herb. Kew.); cane thickets on the slopes of the Lei-lung Shan, lat. 28° 10′ N., 4200 m., July, 1917, *Forrest* 15211 (Herb. Kew.).

Allied to the preceding *A. Forrestii*, but differs in its slenderer habit, multinoded flowering branches, longer cuspidate glumes, and shorter anthers.

XVI—MISCELLANEOUS NOTES.

Eightieth Birthdays. We offer our sincere congratulations to the following botanists who have attained the age of eighty during 1935 :—Professor J. M. Macfarlane (Sept. 27th), Professor F. O. Bower (November 4th), Mr. H. N. Ridley (Dec. 10th), and Professor C. Schröter (Dec. 19th).

DR. J. HUTCHINSON.—Dr. Hutchinson has been elected an Honorary Fellow of the American Amaryllis Society.

ALBERT SPEAR HITCHCOCK.—The unexpected death of Dr. A. S. Hitchcock on Dec. 16th, 1935, will be deeply regretted by his many friends in this country. Owing to a heart attack he passed away on board the liner in which he was returning to the United States after spending several months in Europe visiting various herbaria and attending the International Botanical Congress at Amsterdam. For many years Hitchcock had been a regular correspondent of Kew, and only the day before sailing, found time to visit the Herbarium in order to complete his studies there.

Albert Spear Hitchcock was born at Owosso, Michigan and celebrated his 70th birthday on Sept. 4th last, whilst at Amsterdam. He was educated at the Iowa State College, where he took his B.S.A. degree in 1884, followed by his M.S. and Sc.D. degrees in 1886 and 1920 respectively. An honorary D.Sc. degree was conferred on him by the Kansas State College in 1934.

Hitchcock was mainly occupied with teaching in the first stage of his career from 1885 to 1901, his most important position in this capacity being the Professorship of Botany at the Kansas State College (1892–1901). It was during this period that he published a number of papers on the plants and flora of Iowa, Kansas and Florida, on ecology, economic plants, etc. In addition, whilst serving as Botanical Assistant at the Missouri Botanic Garden (1889–91), he went on an expedition to the West Indies and an account of the plants collected in the Bahamas, Jamaica and Grand Cayman appeared in 1893. From 1901 onwards most of his time was devoted to the study of the Gramineae, first as Assistant Agrostologist and later (1905) as Systematic Agrostologist to the United States Department of Agriculture. At that time he was appointed also Custodian of the Section of Grasses at the United

States National Museum. Since 1928, he had been Principal Botanist in charge of Systematic Agrostology in the U.S. Department of Agriculture.

In order to study grasses in their natural habitats and to make collections for the Washington Grass Herbarium, he made extensive expeditions to many parts of the world. At one time or another he had visited all the American States and in fact most countries in America from Alaska to Chile on the west and Labrador to British Guiana on the east. In 1916, he collected in the Hawaiian Islands and in 1921 in Japan, China, Indo-China and the Philippine Islands. At various times he had travelled in Europe for the purpose of studying the type-specimens of American grasses preserved in continental and British Herbaria, or to attend botanical conferences. In 1929, Hitchcock was invited to attend the combined meetings of the British and South African Associations for the Advancement of Science at Cape Town and Johannesburg. The return journey to the United States was made via Southern Rhodesia and East Africa. He spent some days at the Agricultural Research Institute at Amani in Tanganyika Territory and later a week at Moshi whence he ascended Kilimanjaro to 13,000 ft. He stayed several weeks in Kenya Colony and finally visited Uganda. At all these centres and wherever he stopped Hitchcock collected grasses, and even on a railway journey he was to be seen struggling into the carriage at the last moment heavily laden with bundles of specimens snatched during a brief halt.

It would take far more space than can be allotted here to do full justice to Dr. Hitchcock's numerous and invaluable contributions to our knowledge of the Gramineae. They commence nearly forty years ago with an account of the grasses of Kansas (1896–98). After his appointment as Agrostologist at Washington, there appeared a continuous series of publications from his pen, comprising grass-floras of Cuba, Mexico, West Indies (with Mrs. Chase), British Guiana, Peru, Bolivia and Ecuador, and Central America ; monographs of the American species of *Agrostis*, *Leptochloa*, *Panicum* (with Mrs. Chase), *Echinochloa*, *Aristida*, etc.; the " Genera of Grasses of the United States " ; a " Manual of Farm Grasses " ; besides numerous papers on type-specimens, nomenclatural problems and new species. His last great work dealt appropriately with the grasses of his own country. This was the " Manual of Grasses of the United States," published in 1935 and containing descriptions of over 1100 species, nearly all being illustrated. He was the author of two other important works, namely, his " Text-Book of Grasses " and " Methods of Descriptive Systematic Botany."

No biographical notice of Hitchcock would be complete without special reference to his work on plant nomenclature. Unlike some nomenclaturists he always kept an open mind and was guided very largely by practical considerations.

The division of opinion at the Vienna Congress left an unfortunate legacy of ill-feeling between some of the keenest supporters

of the International Rules and of the American Code. In the Regulations for Fixing Generic Types (Science, n.s. **46.** 333–336 : 1919) in the preparation of which he took so prominent a part, the type method was developed in a manner more suitable for general acceptance. Mechanical provisions for fixing types, such as the acceptance of the first species mentioned by the author as the generic type, though not entirely eliminated were much less stressed, greater importance being attached to the original description and other elements showing what species the author had chiefly in mind.

Hitchcock's ideas were further developed in the Type-Basis Code of Botanical Nomenclature, (Science, n.s. **53.** 312–314 : 1921) the publication of which did much towards popularizing the type-method. By his writings and his support at the Fourth International Botanical Congress, Ithaca, 1926, of a project for nomenclatural re-union, Hitchcock contributed largely to the international agreement on the subject so happily attained at Cambridge in 1930. In this work of conciliation his modesty and kindly disposition played a great part.

The practical nature of much of Hitchcock's work on nomenclature is seen in a paper on the "Standard-species of Linnean genera of Phanerogamae" (Prop. Brit. Bot. 111–195 : 1929) of which he was part author. Almost his last work was the completion of his report and votes on generic names proposed for conservation at Amsterdam.

Hitchcock was undoubtedly one of the world's most distinguished agrostologists, and his name will be linked with those of Trinius, Nees, Bentham, Hackel and Stapf, as one who has greatly advanced and clarified our knowledge of the grasses.

Neville Louis Cooper.—We regret to record the death of Mr. N. L. Cooper which took place suddenly at his residence, Wellington Crescent, Ramsgate, on January 9th. Mr. Cooper was 71 years of age and had for many years been a correspondent of Kew in connexion with his interest in conifers and in rock plants. His father, Thomas Sidney Cooper, C.V.O., R.A., of Canterbury, was famous as a painter of animals, and the son inherited his love for art, an interest that he was able to turn to practical account when it became necessary for him to adopt a business career. For many years he was in business as a picture dealer until ill-health compelled him to retire. During retirement his time was fully occupied with his pinetum at Little Hall, St. Stephens, Canterbury, and his rock garden and supplementary collection of conifers at Vernon Holme, Harbledown. Conifers at both places were very well grown, and Mr. Cooper was awarded a Silver Banksian Medal by the Royal Horticultural Society for a collection of specimens contributed to the Conifer Conference in 1930.

His pinetum contains many rare species which he tended as children and was very grieved when one died. In view of this his forgiving spirit, as shown in the following anecdote, is all the more

remarkable. Amongst his trees at Little Hall was a very vigorous young specimen, five or six feet high, of *Picea Breweriana*, which three or four years ago was hacked off and carried away by a thief for use as a Christmas tree. The culprit was traced, but was let off after a mild chiding. In relating the incident to the writer, Mr. Cooper concluded, " After all, how was the poor man to know that he was cutting down my rarest tree ? " His rock garden at Vernon Holme took up much of his time during the last few years. It covers an extensive area and contains many choice plants, although the owner was more interested in the production of broad effects by special subjects than in the cultivation of a great number of species.

W. DALLIMORE.

Works on Diatomaceae available on loan, II.*—Some time ago Mr. Adams sent to Kew a second collection of his duplicate books on diatoms, to be added to others received at an earlier date by the Bentham-Moxon Trustees for study by workers on this group of plants. The books may be consulted at Kew or borrowed by responsible persons on payment of carriage both ways.

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*See K.B. 1932, 250.

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32. **Hendry, W.** On *Hyalodiscus subtilis* (syn. *Craspedodiscus Franklini*) (Quart. Journ. Microsc. Sci. N.S. **1**). [London, 1861]. 8vo. 4 pp.

33. **Hendry, W.** On *Navicula rhomboides* (Quart. Journ. Microsc. Sci. N.S. **1**). [London, 1861]. 8vo. 4 pp.

34. **Johnston, Christopher.** Descriptions of *Diatomaceae*, chiefly of those found in " Elide " (Lower California) Guano (Quart. Journ. Microsc. Sci. **8**). [London], 1860. 10 pp. 2 pls.

35. **Kitton, Frederick.** Diatomaceous deposits from Jutland. I–II. (Journ. Quekett Microsc. Club. **2**). [London], 1870–71. 8vo. 8 pp. 2 pls.

36. **Kitton, F.** Description of some new *Diatomaceae* found in the stomachs of Japanese oysters by Fred. Kitton . . . with a list of the species observed by **E. Grove** . . . Also a description of some new or undescribed forms from other localities by **F. Kitton** (Journ. Quekett Microsc. Club, Ser. 2, **2**). [London], 1884. 8vo. 8 pp. 2 pls.

37. **Lauder, Henry Scott.** On new Diatoms (Trans. Microsc. Soc. **12**). London, 1864. 8vo. 3 pp.

38. **Lauder, Henry Scott.** Remarks on the marine *Diatomaceae* found at Hong Kong, with descriptions of new species ; with notes by **J. Ralfs** (Trans. Microsc. Soc. **12**). London, 1864. 8vo. 5 pp. 1 pl.

39. **Norman, G.** On some undescribed species of *Diatomaceae* (Trans. Microsc. Soc. **9**). [London, 1861]. 8vo. 5 pp. 1 pl.

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42. **Roper, F. C. S.** On the genus *Licmophora* (Agardh). (Journ. Microsc. Soc. **3**). [London], 1863. 10 pp.

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44. **Smith, Hamilton L.** Notes on *Diatomaceae* found near Gambia, O. (Trans. Microsc. Soc. **8**). [London], 1860. 8vo. 3 pp.

45. **Wallich, G. C.** On the siliceous organisms found in the digestive cavities of the *Salpae*, and their relation to the flint nodules of the chalk formation (Trans. Microsc. Soc. **8**). [London], 1860. 8vo. 20 pp.

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1. **Baddeley, W. H. C.** On some *Diatomaceae* that are found in *Noctiluca miliaris*, and the best means of obtaining them (Journ. Micr. Sci. **6**). [London], 1858. 8vo (MS. copy) 4 pp.

2. **Burgess, E. W.** Notes on the structure of the *Diatomaceae* (Micr. News & Northern Microscopist.). London & Manchester, 1883. 5 pp.

3. **Cole, A. C.** The preparation of *Diatomaceae* (Methods Micr. Res., part 10). London, 1884. 8vo. 5 pp.

4. **Cole, T.** List of infusorial objects found chiefly in the neighbourhood of Salem, Mass., etc (Essex Inst. Proc. **1**). Salem, 1853. 18 pp.

5. **Cottam, A.** On a new *Aulacodiscus*, from the West Coast of Africa (Journ. Quek. Micr. Club, **4**). [London, 1876]. 5 pp. 1 pl.

6. **Davidson, Rev. G.** On a Diatomaceous Deposit in the district of Cromar, Aberdeenshire (Trans. Edinb. Bot. Soc. **12**). [Edinburgh, 1876]. 2 pp.

7. **Davidson, Rev. G.** List of *Diatomaceae* found in Loch Kinnord Kieselguhr (Trans. Edinb. Geol. Soc.) 4 pp.

8. **Ernest, A. & Slack, H. J.** Diatomaceous earth from the Lake of Valencia, Caracas (Monthly Micr. Journ.: Trans. R. Micr. Soc. **6**). [London], 1871. 2 pp.

9. **Gill, C. H.** On diatom structure (Journ. Quek. Micr. Club, **4**). [London, 1892]. 3 pp.

10. **Grunow, A.** New species and varieties of *Diatomaceae* from the Caspian Sea (Journ. R. Micr. Soc. **2**). [London & Edinburgh], 1879. 15 pp. 1 pl.

11. **Hanks, H. G.** Uses of Diatoms (Journ. R. Micr. Soc., Ser. 2, **1**). [London & Edinburgh, 1881]. 5 pp.

12. **Johnston, C.** Descriptions of *Diatomaceae,* chiefly of those found in " Elide " (Lower California) Guano. 10 pp.

13. **Lang, F. H.** Professor Smith's Conspectus of the *Diatomaceae.* (Reading), 1873. 8vo. 4 pp.

14. **Mills, F. W.** *Diatomaceae* (Monthly Circ. Huddersfield Nat. & Photogr. Soc. 1893). [Huddersfield, 1893]. 4 pp.

15. **Morland, H.** On measuring figures of microscopic objects drawn to varying magnifications (Journ. Quek. Micr. Club, **4**). [London, 1892]. 3 pp. 1 pl.

16. **Muller, C. J.** Index to Diatoms figured in the " Quart. Journ. Micr. Sci.," from 1853 to 1867 (Quart. Journ. Micr. Sci. **10**). [London, 1870]. 9 pp.

17. **Nelson, E. M.** The substage condenser : its history, construction, and management ; and its effect theoretically considered (Journ. Quek. Micr. Club, **4**). [London, 1892]. 21 pp. 2 pls.

18. **Partridge, T.** On Diatoms (Journ. Post. Micr. Soc.). [London & Bath, s. a.]. 4 pp.

19. **Rousselet, C.** On " *Amphileptus flagellatus,*" *sp. n.*, a new Infusorian (Journ. Quek. Micr. Club, **4**). [London, 1892]. 2 pp.

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21. **Stephenson, J. W.** Observations on Professor Abbé's experiments illustrating his theory of microscopic vision (Monthly Micr. Journ.: Trans. R. Micr. Soc. **17**). [London], 1877. 7 pp. 1 pl.

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24. **Taylor, B.** The character and distribution of the *Diatomaceae* (Trans. Cumberland Assoc. **5**). Carlisle, 1881. 10 pp.

25. **Thwaites, G. H. K.** On Conjugation in the *Diatomaceae* (Ann. & Mag. Nat. Hist. **20**). [London], 1847. 8vo. 2 pp. 1 pl.

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27. **Thwaites, G. H. K.** Further observations on the *Diatomaceae*; with descriptions of new genera and species (Ann. & Mag. Nat. Hist., Ser. 2, **1**). [London], 1848. 8vo. 12 pp. 2 pls.

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29. **Vorce, C. M.** The motion of Diatoms (Amer. Monthly Micr. Journ. **3**). [New York], 1882. 4 pp.

30. **Wallich, G. C.** Observations on the Distribution and habits of the Pelagic and Freshwater free-floating *Diatomaceae* (Ann. Nat. Hist. **5**). [London], 1860. 20 pp.

31. **Wallich, G. C.** On the markings of the *Diatomaceae* in common use as test-objects (Ann. & Mag. Nat. Hist., Ser. 3, **5**). [London], 1860. 8vo. 9 pp.

32. **Wallich, G. C.** On the relation between the development, reproduction, and markings of the *Diatomaceae* (Monthly Micr. Journ.: Trans. R. Micr. Soc. **17**). [London], 1877. 21 pp. 2 pls.

33. **Woodward, J. J.** A simple device for the illumination of balsam-mounted objects for examination with certain immersion objectives whose "Balsam angle" is 90° or upwards (Monthly Micr. Journ.: Trans. R. Micr. Soc. **18**). [London], 1877. 4 pp.

34. **Woodward, J. J.** Observations suggested by the study of *Amphipleura pellucida*, mounted in Canada Balsam, by lamplight and sunlight, with various objectives (Journ. R. Micr. Soc. **2**). [London & Ediburgh], 1879. 8vo. 12 pp.

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1. **Cleve, P. T.** Diatoms from the West Indian Archipelago (Bih. K. Svensk. Vet.-Akad. Handl. **5**). Stockholm, 1878. 8vo. 22 pp. **5** pls.

2. **Gill, C. H.** On some methods of preparing diatoms so as to exhibit clearly the nature of their markings (Journ. R. Micr. Soc. Part 2. 1890). [London & Edinburgh], 1890. 4 pp.

3. **Gran, H. H.** Bemerkungen über einige Planktondiatomeën (Nyt Mag. Naturv. **38**). Christiania, 1900. 8vo. 26 pp. 1 pl.

4. **Kain, C. H. & Schultze, E. A.** On a fossil marine diatomaceous deposit from Atlantic City, N.J. (Bull. Torr. Bot. Club, **16**). [New York], 1889. 8vo. 6 pp. 1 pl.

5. **Kain, C. H. & Schultze, E. A.** On a fossil marine diatomaceous deposit from Atlantic City, N.J.—II. (Bull. Torr. Bot. Club, **16**). [New York], 1889. 8vo. 4 pp. 2 pls.

6. **Minchin, E. A.** Some recent researches on the movements of Diatoms (Nat. Sci. 1892). [London & New York], 1892. 4 pp.

7. **Péragallo, H.** Diatomées de la baie de Villefranche (Diatomées du Midi de la France). 92 pp. 6 pls.

8. **Schultze, E. A.** A descriptive list of Staten Island diatoms (Bull. Torr. Bot. Club, **14**). [New York], 1887. 11 pp. 2 pls.

9. **Schultze, E. A.** A descriptive list of Staten Island diatoms (Bull. Torr. Bot. Club, **16**). [New York], 1889. 8vo. 7 pp. 1 pl.

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11. **Smith, H. L.** Conspectus of the families and genera of the *Diatomaceae* (Lens, **1**). 19 pp.

Opuscula Vol. E.

1. **Mann, A.** Suggestions for collecting and preparing diatoms (Proc. U.S. Nat. Mus. **60**). Washington, 1922. 8vo. 8 pp.

2. **Mann, A.** List of *Diatomaceae* from a deep-sea dredging in the Atlantic Ocean off Delaware Bay by the U.S. Fish Commission steamer Albatross. (Proc. U.S. Nat. Mus. **16**). Washington, 1893. 8vo. 10 pp.

3. **Mann, A.** Report on the diatoms of the Albatross voyages in the Pacific Ocean, 1888–1904 (Contrib. U.S. Nat. Herb. **10**). Washington, 1907. 8vo. 199 pp. 11 pls.

1. **Conger, P. S.** A technique for type mounts of plankton Diatoms and other microplankton (Journ. R. Micr. Soc. 1925). [London], 1925. 8vo. 5 pp.

2. **Conger, P. S.** Diatoms (in the Flora of Penikese, fifty years after, ed. by I. F. Lewis) (Rhodora, **26**). [Lancaster, Pa.], 1924. 8vo. 9 pp.

3. **Mann, A.** Marine Diatoms of the Philippine Islands (Bull. 100, U.S. Nat. Mus. **6**). Washington, 1925. 8vo. 182 pp. 39 pls.

Amsterdam Resolutions.—The following resolutions which were passed at the Sixth International Botanical Congress at Amsterdam, 1935, are published at the request of the Executive Committee.

1. General Resolution.

It is proposed that the Botanical Section of the International Union of Biological Sciences should act as an administrative connecting link between successive International Botanical Congresses, which maintain their full independence from an international point of view to such an extent that any country which has not joined the Union, will have quite the same rights as those which have joined.

It is proposed that this Botanical Section be authorized to carry through any resolutions, carried by the International Botanical Congresses.

Proposed by A. C. Seward and seconded by J. C. Schoute, E. J. Butler, E. D. Merrill, N. Němec, M. J. Sirks and N. E. Svedelius.

2. General Resolution.

By reason of the growing financial difficulties and the prohibitive price, for certain museums and laboratories, of transmission by post, rail and boat, it becomes impossible to guarantee the indispensable exchange of collections of dried plants. It is therefore necessary to obtain for this exchange the free transport now accorded to the exchange of scientific publications.

The Congress asks the Office of the International Union of Biological Sciences to take the necessary steps with various governments in order to obtain this postal privilege.

Proposed by B. P. G. Hochreutiner and seconded by H. Humbert, E. D. Merrill, A. A. Pulle and C. Skottsberg in the name of the meeting of Directors of Botanical Gardens.

3. Section Agr.

That the Seventh International Botanical Congress shall arrange a Section for Agronomy on the same lines as that of the Sixth Congress.

Proposed by the Section for Agronomy.

4. Sections Cyt. and Gen.

That the Botanical Section of the International Union of Biological Sciences on behalf of the Sixth International Botanical Congress should apply to the International Committee for Genetical Congresses for the appointment of an International Committee to study the different meanings of various cytological and genetical terms used in the literature, to propose exact definitions of these terms and to suggest if and what further steps are necessary to improve the terminology of genetics and cytology.

Proposed by F. W. Sansome and seconded by M. J. Sirks.

5. Sections Cyt. and Gen.

The Sections of Genetics and Cytology of the Sixth International Botanical Congress take the occasion of their presence in Holland to record the deep sense of debt which the sciences of Genetics and Cytology owe to Hugo de Vries. It is a satisfaction that he lived to such a ripe old age and thus saw the imposing structure which has been erected on the foundations in the laying of which his painstaking investigations and prophetic vision had so large a share.

The Honorary Secretary of the Congress is hereby requested to record this resolution in the minutes of the Proceedings and to send a copy to Mrs. de Vries with the sympathy of the Congress and with the assurance that Hugo de Vries will remain for all time an inspiration to biologists and live as one of the immortal heroes of Science.

Proposed by A. F. Blakeslee and seconded by F. Oehlkers and E. W. Sinnott.

6. Section Geo.

The Sixth International Botanical Congress at Amsterdam, 1935, appeals to all botanists and cartographists with the request that they should employ for the same plant communities the same colouring and for sociologically related plant communities, especially in survey maps, similar tints, in accordance with the proposals which the Fifth International Botanical Congress put forward at Cambridge. Should the case arise, necessary modifications shall be made.

7. Section Geo.

The Sixth International Botanical Congress draws the special attention of Public Bodies, Scientific Institutes and Societies for the International Protection of Nature to the regrettable danger of inconsiderate destruction of primitive vegetation to which, in

the future vast territories, especially in tropical and subtropical countries, will be exposed through the nefarous practice of brushwood and prairie fires.

It points out the often radical changes brought about by this practice in the biologic complex constituted by the community of plants and animals. On the one hand, a very great number of species are threatened in a short time with total extinction ; many of them being of the greatest interest from the scientific, aesthetic and economic points of view. On the other hand, countries formerly covered with a woody vegetation of various types, are becoming, or are in process of becoming, deserts in consequence of the changes which the destruction of this vegetation produces upon the local climate, the hydrologic conditions and the physico-chemical characters of the soil.

The Congress emphasises the necessity :

(1) Of constituting in these countries permanent and fairly extensive reserves for safeguarding the equilibrium of the natural conditions and the living members of the vegetable and animal kingdoms (National Parks) ;

(2) Besides the territories thus constituted as permanent Reserves, to lessen in some measure the consequences of the deforestation and exploitation by maintaining an adequate proportion of forest areas, taking this in its widest sense ;

(3) To prevent the substitution of natural formations of woody autochthones by those of exotic species (in accordance with the conclusions of the International Conference for the Protection of the Fauna and Flora of Africa, London, 1933).

Proposed by H. Humbert and P. G. van Tienhoven and seconded by R. Bouillenne, J. Burtt Davy, A. Chevalier, L. Emberger. A. W. Hill, J. Jeswiet, P. Ledoux, R. Maire, E. D. Merrill, G Negri, I. B. Pole Evans, J. Ramsbottom and A. Wilczek.

8. Section Geo.

The Sixth International Botanical Congress is conscious of the great dangers that result from the destruction of tropical and subtropical vegetation, and also of the perturbation caused in such regions by the action of man.

The Congress recommends the study of these problems by the botanists of these countries and that they may inform their governments.

The Congress asks especially that this information shall be collected and that it shall be published with a view to the most efficient protection of the indigenous vegetation.

The Congress appoints a Committee for studying this subject and for submitting a report to the Seventh Congress. The following members of this Committee are nominated : I. B. Pole Evans, president ; H. Humbert, E. D. Merrill and J. Nabelek, vice, presidents ; R. Bouillenne, H. Brockmann Jerosch, A. Cheva-

LIER, L. EMBERGER, A. W. HILL, J. JESWIET, P. LEDOUX, R. MAIRE, G. NEGRI, L. R. PARODI and M. F. GALLEGO QUERO and as secretary J. TROCHAIN.

Proposed by I. B. POLE EVANS and seconded by H. HUMBERT.

9. SECTION GEO.

That the programme of the Seventh International Botanical Congress shall contain the study and the delineation of the characters of the various types of steppes, their origin, their development and especially of the discriminative criteria for climatic associations and secondary associations which get confused under the names "steppe," "prairie," "savannah," and of thedefinitions of the corresponding phytogeographic regions.

Proposed by H. HUMBERT and seconded by L. EMBERGER, H. GAMS, R. MAIRE, R. BOUILLENNE, A. EIG, G. NEGRI, J. TROCHAIN, H. BOJKO, P. LEDOUX, A. CONARD, E. WILCZEK, E. SCHMID and J. PODPĚRA.

10. SECTION GEO.

A committee shall be appointed to elaborate proposals for a classification of climates from a phytogeographical point of view and to submit them to the Seventh International Botanical Congress.

Proposed by L. EMBERGER and seconded by H. BROCKMANN JEROSCH, S. P. AGHARKAR, A. CHEVALIER, A. EIG, H. GAMS, H. HUMBERT, P. LEDOUX, T. LIPPMAA, R. MAIRE, G. NEGRI, R. PAMPANINI, I. B. POLE EVANS, J. TROCHAIN.

11. SECTION GEO.

The Geobotanical Section of the Sixth International Botanical Congress recommends :

(1) To use the term *Sociation* for vegetation units characterized mainly by dominance in the different layers, in the sense of Scandinavian plant sociologists ;

(2) To use the term *Association* for vegetation units characterized mainly by characteristic and differential species in the sense of Zürich-Montpellier plant sociologists, or at least for units of the same order of sociological value ; *Subassociation* and *Facies* can, where necessary, be used for their subordinate units ;

(3) To unite sociations and associations into alliances in the sense of Zürich-Montpellier plant sociologists, and the alliances into higher units.

Proposed by J. BRAUN BLANQUET, G. E. DU RIETZ and R. NORDHAGEN.

12. SECTIONS MYC. AND PATH.

The Sixth International Botanical Congress wishes to express its sincere appreciation of the admirable work accomplished by the Centraalbureau voor Schimmelcultures at Baarn since its foundation in 1906 and views with grave concern the present financial difficulties of what is essentially an international institution.

Proposed to the Section Myc. by J. Ramsbottom and seconded by E. J. Butler; to the Section Path. proposed by E. Rhiem and seconded by E. C. Stakman.

13. Section Path.

The Committee on Description and Nomenclature of Plant Viruses appointed by the Fifth International Botanical Congress, 1930, wishes to report that it has made progress in developing a scheme for the nomenclature of plant viruses and suggests to this Congress that the Committee be empowered to continue its considerations and establish an acceptable system of virus nomenclature.

Proposed by H. M. Quanjer and seconded by James Johnson, P. A. Murphy, J. Henderson Smith and G. Samuel.

14. Section Path.

It is recommended that the term "physiologic race" be substituted for "physiologic form" as the former seems more appropriate. It is recommended further that the word "race" be used in general to designate biotypes or groups of biotypes that differ from each other in physiologic characters.

Proposed by E. C. Stakman and seconded by Miss M. Newton, Miss G. Wilbrink and Th. Roemer.

15. Section Path.

The Sixth International Botanical Congress expresses itself of the opinion:

That an effective and unceasing campaign against destructive plant diseases and insect pests, can be successfully prosecuted only by international action and mutual co-operation;

That close and frequent international discussion of the problems of plant quarantines should take place to bring about improvement of the health conditions of plants and plant products offered for export.

That it unanimously recognises that such action will greatly facilitate international trade in the commodities concerned; and

That, finally, this resolution be brought to the attention of the League of Nations, emphatically endorsing the League's proposal to give this matter urgent and careful consideration with a view to facilitating and expediting the purpose and aims of this resolution.

Proposed by H. T. Gussow and seconded by N. van Poeteren.

16. Section Sys.

The Sixth International Botanical Congress agrees to the following propositions by the International Standing Committee for Urgent Taxonomic Needs:

(1) Compilation of a new Phytography. The book should not cover the whole content of De Candolle's "Phytographie"; it should consist of a new compilation of the collections represented in the larger herbaria of the world. The Institutes are asked to draw up a list of their collections.

(2) Photographs of Type Specimens. The scheme to photo-

graph the types of all plants is important, and should be encouraged, but involves very great expense. As the means of most Institutes are restricted at the present time, this point should be postponed to the next Congress.

(3) International Dictionary of Botanical Terminology. The Dictionary should be restricted to Phanerogams. The Cryptogams are to be worked out by specialists of the individual groups. The Latin word should be translated and explained in English, French and German. For use in countries of other languages the botanists of such countries should supply translations. All terms would be given in alphabetical sequence. At the end, the most important terms for single categories (e.g., leaf, root, Orchids) might be placed together once more.

(4) It is highly desirable, that the Linnean type specimens at the Linnean Society and at the British Museum should be photographed.

Proposed for the International Standing Committee for Urgent Taxonomic Needs by L. DIELS and seconded by A. D. COTTON, R. E. FRIES, R. MAIRE, E. D. MERRILL and J. RAMSBOTTOM.

17.—SECTION SYS. SUBSECTION NOMENCLATURE.

Votes of Thanks.

To the Editorial Committee of the International Rules of Botanical Nomenclature, ed. III (1935), namely, Professor HARMS (General Editor), Dr. RENDLE and Professor HOCHREUTINER, for the successful manner in which they carried out their difficult task.

To the Executive Committee of the Fifth International Botanical Congress, Cambridge 1930, for defraying the cost of publication of the "Synopsis of Proposals" and "Preliminary Opinions" concerning nomenclature.

Resolution.

That the Sixth International Botanical Congress accepts the decisions of the Section of Taxonomy and Nomenclature concerning the modification of the International Rules of Botanical Nomenclature, ed. III (1935) and sanctions the appointment of the Standing Committees proposed by this Section.

Proposed by E. D. MERRILL and seconded by L. DIELS.

Economic Products of the Malay Peninsula.*—This work, published on behalf of the Governments of the Straits Settlements and Federated Malay States, should be to those countries what Sir George Watt's classic "Dictionary of the Economic Products of India" has been to India. It is modelled on similar lines,

* "A Dictionary of the Economic Products of the Malay Peninsula", by I. H. Burkill. Crown Agents for the Colonies, London, 1935. Pp. 2402, 2 vols. Price 30s.

although naturally smaller, and is a veritable store-house of information on the diverse economic products—vegetable, animal and mineral—that are to be found throughout Malaya.

The author, who was previously Officiating Reporter on Economic Products to the Government of India and Superintendent of the Industrial Section of the India Museum at Calcutta, became Director of the Gardens at Singapore in 1912. The preparation of the Dictionary actually commenced at this period, as the author points out in the introduction, although the greater part of its compilation has been carried out at Kew after his retirement from the Colonial Service in 1925.

A glance through the pages of the two large volumes gives some idea of the vast amount of labour that has been necessary in their compilation and preparation. Vegetable products occupy approximately nine-tenths of the subject matter and Mr. Burkill has been alone responsible for almost all of what appears in regard to them. A team of workers shared the task of preparing "The Dictionary of the Economic Products of India," and therefore Mr. Burkill's achievement in having completed so arduous a task practically single-handed deserves the highest praise. The contributions by other writers are those of known authorities on Malayan economic products in the geological, forestry and fishery fields. These constitute a relatively small proportion of the work and appear in the text under the initials of their respective authors.

The arrangement throughout is alphabetical, and vegetable products appear wherever possible under the genera to which they belong, with sub-headings for different species. In some instances, notably with minerals and well-known animals, the subjects are classified according to their common names. As copious cross-references occur and a general index is incorporated, the work is easy of reference. Marginal notes, indicating at a glance the content of the adjoining text, are a feature that will be appreciated. References to literature are given pertinently and not as separate lists.

The main object of the work, as the author states, has been to bring together existing information on Malayan products, as this occurs scattered over a wide range of literature not readily accessible even in the larger libraries. This has been accomplished and at the same time a great deal of valuable additional information, hitherto unpublished, has undoubtedly been incorporated. This the author modestly omits to mention in his introduction. It is questionable, for instance, whether such useful and detailed information on rattans as that which is given (occupying sixteen pages) exists elsewhere. Such aspects as the meaning of the word "rotan," general characteristics, collection, drying, trade supplies, uses, cultivation requirements, trade and Malay names with botanical equivalents all receive close attention. This thoroughness of treatment is typical throughout the work. Many of the products dealt with, such as various tropical crops, fruits and vegetables,

are not peculiar to Malaya, but are widely distributed in cultivation in warm countries. The usefulness of the book will not therefore be limited to the particular region for which it is intended.

The information given regarding early introductions of economic plants to Malaysia from other regions and their subsequent spread and general adoption is especially valuable. Having made a special study of Malay and other local native plant names the author is often able to employ this knowledge to advantage in his deductions as to the probable time and place of origin of certain plants. Native names are given for most species, and as these also appear alphabetically in the index, the book may be regarded as " A Dictionary of Malay Plant Names " in addition to its other functions.

In a work of this magnitude a few minor omissions are perhaps inevitable. A few appear to have occurred in regard to the index. Neither of the words " rubber " and " oil palm " appears in the index or as a heading in the text. To find the information given in regard to them it is necessary to look under *Hevea* and *Elaeis* respectively. While such omissions are not of great consequence, they may be a source of difficulty to some readers.

The printing and binding of the book, the work of the Oxford University Press, leave nothing to be desired and the price at which it is sold is certainly most reasonable for a work of this magnitude.

F. N. HOWES.

Flora of Southern Quebec.*—Under the somewhat ambiguous title, " Flore Laurentienne," Dr. Marie-Victorin has given us what is virtually a flora of Southern Quebec. Actually the area of his flora covers only about one half of the St. Lawrence valley : the Gaspé peninsula, Anticosti island, and the whole northern shore of the St. Lawrence below the Saguenay river, are excluded on grounds of convenience, since these regions are relatively sparsely populated and difficult of access, and their flora is still very imperfectly known. The southern boundary of the area coincides with the limits of the Province of Quebec, while the northern boundary at first follows the Hudson Bay-St. Lawrence watershed eastward, and then passes just north of Lake Saint-Jean and the Saguenay river, the boundary on the southern shore of the St. Lawrence being formed by the Matapédia river.

The total vascular flora of the area amounts to 1568 species—64 Pteridophytes, 13 Gymnosperms, 987 Dicotyledons and 504 Monocotyledons—compared with 1917 species recorded for the whole Province of Quebec. The arrangement of families follows

* " Flore Laurentienne," by Frère Marie-Victorin, D.Sc., Director of the Botanical Institute of Montreal. De La Salle Press, 949, Côté Street, Montreal, Quebec, Canada, 1935. Pp. 917, with 22 maps and 2,800 text-figs. by Frère Alexandre, L.Sc., Price, in cloth binding, 5 dollars.

the classification adopted by Wettstein in the third edition of his " Handbuch der systematischen Botanik " (1924). The keys to the genera and species draw largely on details of habit and habitat to the exclusion of technical characters which might offer difficulties to the tyro—in fact the work appears to be intended, not for professional botanists, but mainly, if not exclusively, as a practical handbook for the use of amateurs, and in particular for the " Cercles des Jeunes Naturalistes," to whose youthful members it is dedicated (p. 11). This purpose it seems admirably calculated to fulfil, the keys and short descriptions of the species being supplemented by clear and characteristic habit figures with occasional structural details. As a work of reference, on the other hand, it leaves much to be desired, the morphological information supplied being sometimes extremely meagre, as in the case of *Salix fragilis* and *S. alba*. The only " characters " by which these two species are distinguished in the key from the 14 native ones are that they are large trees planted round houses !

The history of botany in Quebec begins with the publication in 1635 of Jacques Cornuti's " Canadensium Plantarum Historia," in which *Actaea alba, Actaea rubra, Apios americana, Rhus Toxicodendron, Aquilegia canadensis, Asarum canadense* and other characteristic species were described and figured for the first time. Other descriptions of Quebec plants were included in Charlevoix, " Histoire et description generale de la Nouvelle-France," vol. 4 (1744). Considerable additions were made to the knowledge of the Canadian flora by André Michaux in his " Flora boreali-americana " (1803), and by his son François André Michaux, author of " Histoire des arbres forestiers de l'Amerique septentrionale " (1810-13), which appeared in English under the title of " The North American Sylva " (1859). The first flora of the Quebec region, however, was Provancher's " Flore Canadienne " (1862), which served for three-quarters of a century as the breviary of French Canadian amateur botanists.

The area of the " Flore Laurentienne " may be divided into three distinct phytogeographic regions : (1) the low alluvial plain of the St. Lawrence, formed of palaeozoic sedimentary rocks covered by glacial drift and by beds of sand and clay deposited during the Champlain period ; (2) the Laurentidian region to the north, formed of pre-Cambrian gneiss with intrusions of granite, basalt and syenite ; and (3) the Alleghanian region to the south, of complicated geological structure, including extensive calcareous formations, argillaceous schists, intrusions of serpentine, Cambrian quartzites and granitic intrusions.

The alluvial plain of the St. Lawrence falls within the zone of broad-leaved trees which extends also southwards into the Alleghanian region. Northwards and north-eastwards comes the zone of mixed forests, and still further to the north, the transitional zone which extends to the Hudson-St. Lawrence watershed, Lake St. Jean and the Saguenay river. Beyond this come the northern

coniferous forest zone and the subarctic forests. The Laurentian region, generally, is characterized by the presence in considerable quantity of *Acer saccharum, Betula lutea, Pinus resinosa* and *Pinus Strobus.*

Nearly sixty pages (pp. 20–78) are devoted to a general sketch of the flora of the whole Province of Quebec, which the author divides into the following regions : " 1, Région arctique ; 2, Région hudsonienne ; 3, Région laurentienne, (a) Sous-région du Bouclier précambrien, (b) Sous-région apalachienne, (c) Sous-région de la plaine alluvionaire du Saint Laurent." Owing to the discursive style in which this sketch is written, it is almost impossible to summarize : indeed it would have gained greatly by elimination of generalities which have little connection with the essential subject-matter.

During the lower Cretaceous period the north American continent was covered by a more or less uniform forest of Gymnosperms. This was divided at the end of the upper Cretaceous period into two areas, western and eastern, separated throughout their length by an extensive tract of sea running north and south. To this fact is attributed the differentiation in the Coniferae of eastern and western North America : the eastern species, *Abies balsamea, Larix laricina, Pinus Strobus, Pinus Banksiana* and *Thuja occidentalis* are represented in the west by *Abies lasiocarpa, Larix Lyallii, Pinus monticola, Pinus Murrayana* and *Thuja plicata* respectively. A map of America and Europe during the Eocene period, showing land bridges north and south of the Tethys sea, is introduced to account for the relationship between the floras of eastern North America and western Europe, which is shown by the occurrence in the two areas of the same or representative species. Reference is made also to the effects of the Glacial period on the Quebec area, and to the peculiar flora of the nunataks found in this region. A map on p. 77 shows the distribution on the St. Lawrence, at the end of 1933, of *Butomus umbellatus*, a European plant first observed about the year 1897. This is rapidly spreading along the St. Lawrence, and displacing native species such as *Scirpus acutus, S. fluviatilis, S. americanus, Sparganium eurycarpum, Zizania aquatica, Sagittaria latifolia* and *S. heterophylla.* A short bibliography, containing references to original sources of information, might have been usefully appended to this section.

Dr. Marie-Victorin is to be congratulated on the successful completion of his flora of Southern Quebec. The hope may be expressed that he will now prepare, on somewhat less popular lines, a flora of the entire Province of Quebec. High praise is due to Frère Alexandre for the excellent and well-chosen illustrations which add so greatly to the value of the work.

T. A. SPRAGUE.

The London Clay Flora.*—In this handsome monograph, based upon an intensive study of the London Clay fruits and seeds by the method of comparative anatomy, palaeobotanists now have the up-to-date and scientific account of this flora so long desired. The book is divided into two parts, an introduction (pp. 1–90), including a full account of previous research, the geology of the formation, methods of palaeobotanical research, the botany of the London Clay with a list of species, the distribution of the living representatives, a comparison between the London Clay and later Tertiary floras, climate, and the relation of the London Clay flora to other Tropical Eocene floras. The main body of the work (pp. 91–541) deals with the systematic description of the flora itself. This will remain as a permanent monument of careful research and study. It is the result of seven years intensive concentration upon a fossil flora of special interest because of its immediate bearing upon the evolution of plants, and of its plain evidence of a tropical climate in British Eocene times. The authors, familiar figures at Kew, make full and generous acknowledgement of assistance rendered by the Herbarium staff.

The work is largely based upon the collection of Dr. James Scott Bowerbank, containing over 120,000 fruits and seeds, of which 25,000 were purchased in 1865 by the British Museum, supplemented by later additions and material collected by the authors. They pay high tribute to Bowerbank's work, which "has stood for years as a model of what palaeobotanical study and exposition ought to be." Of Francis Crow they state that "he was the first to suggest the method of study which is the method we have continually used in our investigation of the London Clay fruits and seeds [that of opening and displaying their internal structure]."

In discussing the geology, the climate, as shown by the fauna, is held to be tropical, but as there were some temperate mollusca the London Clay was no doubt laid down in a sea beyond the mouth of a great river which communicated with the warm Tethys or Nummulitic sea, conditions such as Moseley on the Challenger Expedition found on the Ambernot River, New Guinea.

In part 4, dealing with the practical study of material and methods of research adopted, the importance of extensive collecting and studying living fruits and seeds is emphasised, and the mode of preparation of fossil material described. Only by means of the comparative method was the elucidation of the various states, mineral and vegetable, of the fossil fruits by laboratory methods made possible. Work commenced in 1926 at Kew. The authors say "usually it was by reference to our own collection of living

* By Mrs. Eleanor Mary Reid and Miss Marjorie Elizabeth Jane Chandler. Published by the Trustees of the British Museum. 4vo. Pp. 561+viii, with 33 plates and 17 figures in the text, issued 25th November, 1933. Price £2 10s. 0d. We much regret the delay in the publication of this review.

forms and to our drawings that we were enabled to make preliminary suggestions as to relationship, but full comparison was always afterwards made with material at Kew. When an alliance with one or more families was suggested, we then in Kew Herbarium made as intensive a study of the family or families as possible." The results of these studies will be seen in the systematic part. The authors found some fossils revealed better than living plants such features as the mode of germination or character of successive coats. Fossil fruits were studied by the same method as that used for living fruits and seeds, and as sections were prohibited by the number required, fracture with cutting pliers and dissection were employed to reveal internal structure, an irregular fracture being the best to study the integuments.

The London Clay Flora includes 234 named and 80 unnamed species. None affords evidence of affinity with present floras. They embrace 70 tropical genera related most nearly to those of the Malayan Peninsula, the decrease in wide-ranging genera from Pliocene times being due to the increasingly temperate climate, and separation of the British Isles from the Continent. The warmer elements in the London Clay flora are explained by the occurrence of *Nipa*, living species of which flourish in brackish water on tidal mudflats. *Nipa* travelled along the shores of the Tethys sea from Malaya to the Anglo-Belgian basin. To account for the warm climate phase, a general survey of meteorological and climatological principles and theories as to climatic changes in the past was undertaken. *Nipa* shows that the flora was not an alien one swept down by a great river. Change in world physiography is discussed, and the authors reject Wegener's geophysical hypothesis and favour that of Brooks, his views harmonizing more or less with their own.

In the systematic account, the descriptions in English are well drawn up, based on the material figured in 33 4vo. plates from photographs by Miss Chandler, with helpful explanations. A number of new families, genera and species are described. There is a full bibliography and an excellent index. Misprints are few and the work is printed in clear type on good paper. The authors must be heartily congratulated on the completion of their work, so well done in every way and indispensable to all students of fossil botany.

A. R. HORWOOD.

The Living Garden.*—The eternal dichotomy between the "Scientist" and the "Practical Man" probably attains its most striking expression in man's activities as a cultivator. The gap is, however, becoming less wide. Farmers have been well served in recent years by a number of books on the scientific background

* By E. J. Salisbury, D.Sc., F.R.S. G. Bell & Sons, Ltd., London, 1935. Pp. xi+338. Ill. by 17 plates and many text figs., the latter mostly by Gwendy Caroe. Price 10**s**. 6**d**. net.

of their calling, but gardeners have long been awaiting such a volume as Professor Salisbury has now given them. Its title, " The Living Garden," with its implied contrast to *Hortus Siccus*, indicates the author's aim, which is to help create a body of horticulturists who will treat their gardens, not only as places of beauty or as arenas in which to prove their skill, but also as experimental grounds giving them " unrivalled opportunities for observing living plants at all stages, under most varied conditions, such as are often denied to the Scientist."

Professor Salisbury's treatment of the subject is admirable and judging from the encouraging sales that are reported he should be successful in spreading his ideas among a large section of the horticultural public.

In the first chapter the background of the subsequent treatment is sketched. A garden is defined ecologically as a community in which competition is reduced to a minimum by human interference and in which the various constituents exist, not because they are specially fitted for their position, as in a natural community, but because knowledge and skill here enable the cultivator to impose on a natural community his whims and fancies.

The various factors that underlie his skill and on which his success depends form the subjects of the rest of the book. Chapter titles such as The Soil ; Sunlight and Shade ; Cold and Warmth ; Frost and Fog ; The Spring Emergence ; Seeds and their Germination ; Plant Names ; and the Span of Life, indicate the wide range of topics discussed. In each chapter Professor Salisbury draws on his knowledge as an experimental botanist and as a practical gardener to explain, in language that is never over technical, the principles underlying garden technique. The one or two errors in the chapter on plant names will doubtless be corrected in a second edition.

The photographic plates are excellent, as are the majority of Mrs. Caroe's drawings. In some cases, however, notably in the figure of lily-of-the valley on p. 121, which has the appearance of a water plant emerging from a pond, accuracy has surely been sacrificed to artistic effect.

As a contribution towards bridging the gap between botanist and horticulturist Professor Salisbury's book should be warmly welcomed by the exponents of both branches of plant study.

The Liverpool Herbarium.*—The authorities of the Liverpool Museums are to be congratulated on issuing this valuable guide to their extensive herbarium collections. Mr. H. Stansfield, the Keeper of the Department of Botany, has compiled a work which will be of great interest not only to local naturalists but also to a much wider circle of readers who are concerned with botanical studies.

* Handbook and Guide to the Herbarium Collections in the Public Museums, Liverpool. 1935. Pp. 81, Plates 14. Price 6d.

The Liverpool Museum is fortunate among similar institutions in possessing in addition to a valuable local herbarium several important foreign collections, which previously formed part of the Liverpool Botanic Garden Herbarium. Among these are collections by Bradbury (N. America) ; Pallas (Russia and Siberia) ; Forster (South Sea Islands) ; Nuttall (N. America) ; Heldreich (Greece) ; Roxburgh (India) ; Wallich (India) ; and others of equal interest. These came to the Liverpool Garden in its early days when its first Curator, John Shepherd, was in touch with famous botanists all over the world, and passed to the Museum Herbarium in 1909. Among the more important local collections are those of J. W. Ellis (1857–1916), Robert Brown (1839–1901), Charles Bailey (1838–1924), and John Shepherd (1764–1836), who, with Dr. Bostock, discovered at Formby that mysterious plant *Centaurium latifolium*, a photograph of which is given.

The various collections are described under the heading of the collector's name, biographical details, photographs and references to publications being given in each case. Sheets from some of the larger collections are also illustrated and the handbook concludes with a note on the preparation of plants for the herbarium.

This guide, which is extremely cheap at sixpence, will certainly stimulate interest in one of the most extensive and up-to-date botanical collections in any provincial museum.

Hooker's Icones Plantarum.*—Part 3, of vol. 3, of the Fifth Series, published in August 1935, contains 25 plates with analyses of vascular plants from the Balkans (4), subtropical Asia (5), Australia (5), tropical Africa (8) and tropical South America (3). It includes descriptions of one new genus and fifteen new species, besides illustrations of six recently (1931–35) described species.

A special feature of this part is the greatly extended text accompanying two of the plates, although the price (10/-) remains the same. The letterpress of t. 3261, *Echinopogon intermedius* (Queensland and New South Wales), runs to ten pages, including a key to and descriptions of the seven known species, six of which are new. *Echinopogon ovatus* and other species are commonly known as " Rough Bearded Grass " and are dangerous to stock, causing a peculiar form of staggers. This revision of *Echinopogon* alone makes the part indispensable to agrostologists as well as to students of the Australian flora. Appended to the description of the new genus *Sclerandrium* (t. 3262) (*Gramineae—Andropogoneae*) is a key to and an enumeration of the twelve genera now referred to the group *Polliniastrae*. *Sclerandrium* itself is based on *Ischae-*

* Hooker's Icones Plantarum ; or, figures, with descriptive characters and remarks, of new and rare plants, selected from the Kew Herbarium. Fifth Series. Edited for the Bentham Trustees by Sir A. W. Hill, K.C.M.G., Sc.D., F.R.S., Director, Royal Botanic Gardens, Kew ; Honorary Fellow, Kings College, Cambridge. Vol. 3, Part 3 (London, Dulau & Co., 1935). Price 10s.

mum truncatiglume F. Muell. (Northern Australia), the three other species included in the genus being *Lophopogon intermedius* A. Camus and *L. tenax* Balansa, both natives of Indo-China, and an undescribed one collected by Dr. A. F. G. Kerr in Siam. *Ischaemum fragile* (t. 3263) was the basis of the genus *Digastrium*, which is now shown to be closely linked with *Ischaemum* proper by means of a newly described species, *I. Baileyi*, also from Queensland. *Zoisia macrantha* (t. 3264), a native of Australia and Tasmania, is commonly known as "Coast Couch Grass" or "Prickly Couch Grass," and is of considerable importance as a sand-binder. The roots and rhizomes form a network which consolidates drifting sand, whilst the culms appear to be able to grow up through increasing layers of sand, branching freely and rooting at the nodes.

Specialists in the *Ericaceae* will be interested in the plate of *Agapetes linearifolia* (t. 3255), a species originally described from sterile specimens collected in the Mishmi Hills, Assam, by Griffith in 1836. The flowers were unknown until the plant was re-collected by Kingdon Ward in 1928. Four recently described and interrelated species of *Agapetes* are also illustrated (tt. 3256–3259). The *Acanthaceae* are represented by three new species from tropical Africa (tt. 3266–3268). *Blepharis Hornbyae* (Tanganyika Territory) with beautiful blue, rose-purple or white flowers, is a trailing plant using the evergreen shrubs for its support much in the same way as *Lonicera Periclymenum* does in Europe. *Anisotes umbrosus* and *A. bracteatus*, both also from Tanganyika Territory, are referred to the genus *Anisotes* on account of the structure of their corollas, although their general facies is rather that of *Adhatoda*. The tropical African *Orchidaceae* are represented by four species of *Disperis*, very much alike in general facies, but differing greatly in the structure of their flowers. *D. dicerochila*, a new species from Uganda and Kenya Colony, has a labellum resembling to a remarkable extent the head of an animal bearing two erect horns. *Exochogyne* (tt. 3273–3275) a South American genus of *Cyperaceae*, was previously considered monotypic. Three species are now figured, the two new ones being *E. megalorrhyncha* from British Guiana and *E. decandra* from the Rio Negro, Brazil.

Mariscus Bowmanii (t. 3260) is a native of Queensland, where it appears to be definitely coastal and to be restricted to open *Eucalyptus* forest. *Pentas magnifica* (t. 3265) a suffruticose Rubiaceous plant from Tanganyika Territory has a corolla 6 in. long with a limb 2 in. in diameter.

Hypericum thasium (t. 3251) is the sole known representative of the section *Thasia* Boiss., distinguished by the herbaceous habit, subpentadelphous stamens, 5 styles, 5-locular ovary, 5-valved capsule and equal calyx segments which do not enlarge in fruit. Originally described from Thasos, it has since been found in Thrace and South Bulgaria. *Astragalus glycyphylloides* (t. 3252), to which *A. serbicus* is now reduced, is widely distributed in the Balkan Peninsula, Crimea, and Bithynia as well as in the Caucasus, where

it was originally discovered. *Verbascum gracile* (t. 3253) is a new species collected by Mr. H. G. Tedd in Thrace. *Polygonum icaricum*, first found in Ikaria (Nikaria) has now been discovered by Mr. Tedd in Samothrace.

Bibliography of Soil Science.*—This volume consists of the references published in the first four lists of soil publications issued from the Bureau at Harpenden, arranged according to the Universal Decimal System of Classification of the Institut International de Bibliographie, Brussels. In the explanatory preface this system is explained and the views of readers on its use in the present work are solicited. After the main list of references there follow a subject index, a list of abbreviations of journals, and an author index.

As far as one can tell from a few trial uses, the compilers have done their task exceedingly well and carefully, both as regards the fitting of the subject matter into the decimal classification and in making the two indexes. It is to be hoped that many branches of science, both pure and applied, will come into line with similar bibliographies. With the present-day output of research, these are becoming increasingly necessary. Pedologists, at any rate, are now well served in this respect.

Fungi of South Australia.†—In the previous issues of this journal (K.B. 1922, 254 ; 1924, 303 ; and 1930, 398) there have appeared reviews of a most useful series of handbooks of the Flora and Fauna of South Australia, which is being issued by the Australian branch of the British Science Guild.

In 1934 there appeared the first part of a new volume in this series, a work on the larger fungi by Dr. J. B. Cleland, and the second part was published in June, 1935. There is urgent need for up-to-date Fungus-Floras of our Dominions and Colonies, since mycological knowledge has extended enormously during the past 25 years. Hence we welcome a book such as this, the result of first-hand knowledge of an active field mycologist, who has checked his determinations by correspondence with specialists in other parts of the world.

The first part, dealing with *Agaricaceae*, begins with a short account of the higher fungi in general, with reference to their uses, injurious properties, and various interesting phenomena. Following

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* Bibliography of Soil Science, Fertilizers and General Agronomy, 1931–1934. Imperial Bureau of Soil Science, Harpenden, 1935. Pp. xxxi+473. Price 25s.

† Toadstools and Mushrooms and other Larger Fungi of South Australia, by J. B. Cleland.

Handbooks of the Flora and Fauna of South Australia issued by the British Science Guild, Australian Branch. Part I. June 1934, General Introduction and Toadstools and Mushrooms ; Part II. June 1935, Remaining Hymenomycetes, Gasteromycetes, the larger Ascomycetes and Mycetozoa. Pp. 362, 10 col. plates, 77 text-figures ; price 5s. each part.

this is a glossary explaining technical terms. The main part of the work contains keys to families, genera, and species, with full descriptions of all the species of *Agaricaceae* so far recorded from South Australia. The second part deals in similar manner with the remaining groups of homobasidial Hymenomycetes, Heterobasidiae, Gasteromycetes, some larger Ascomycetes and Mycetozoa. An interesting new species of *Lentinus* found on railway sleepers is described.

There are ten excellent coloured plates, chiefly from charming water-colors by Miss P. Clarke, and 77 uncoloured figures reproduced from photographs of the actual plants or from drawings. At the end of part 2 is an index to the whole.

The work is well produced and can be thoroughly recommended as a guide to the larger fungi of Australia, as far as they are known. At the very modest price of 5s. each part it is remarkably good value.

E. M. WAKEFIELD.

Dictionary of Phanerogamic Genera.*—The recent publication of volume 6 completes this work of reference which will be very valuable in all botanical libraries. The first volume appeared in 1929, and in each successive year, except 1934, a further volume was added. The scope of such a work demands an exhaustive search of botanical literature, as well as expert knowledge of taxonomy and nomenclature, and the author is to be congratulated on finishing the dictionary in six years.

The general plan is the same throughout, the classification being on the whole according to Engler's Syllabus, 1924. The arrangement is strictly alphabetical, each accepted generic name is followed by the name of the author, the place of publication, the family to which it belongs, a technical description in French, the number of species in the genus, the geographical distribution, and finally any generic synonyms. Synonyms are also indexed in their correct alphabetical sequence with appropriate cross references. From volume 2 onwards a greater number of synonyms is included than in the first volume, a distinct advantage to systematists.

The work is brought up to date by the inclusion in each volume of a supplement. In supplements 5 and 6, for instance, many amendments and corrections are included from the family *Sapindaceae* owing to the appearance of Radlkofer's Monograph in Engler's " Pflanzenreich " (1931–1934). Several other similar examples could be enumerated which would show that the work was continually being brought up to date.

In order to facilitate consultation of the whole work, and to avoid generic names appearing in supplements being overlooked,

* Dictionaire descriptif et synonymique des genres de plantes phanérogames, par Albert Lemée. i—vi (1929-1935), Brest, Imprimerie Commerciale et Administrative, 17, rue d'Algésiras. London, Dulau & Co., 32, Old Bond Street.

the author has included in the last volume a number of small labels equal to the number of names of genera in each supplement. These he suggests should be pasted in the margins of the volumes. For those genera that have been *revised* in the supplements, the labels should be placed in front of the generic names in the Dictionary, and for those genera that have been *added* the labels should be placed in the blank space which separates the two genera between which the added genus should be inserted.

The general format of the work is generous and pleasing, and the print throughout is good. A complementary volume is anticipated by the author in which he hopes to present an analytical table of the families and genera for the determination of phanerogamic plants from all regions of the world.

The author is certainly to be congratulated on the successful completion of his laborious undertaking, and on bringing together in one work of reference the essential characters of phanerogamic genera.

M. L. GREEN.

Garden Variety.*—Practical gardeners will be very grateful to Lady Hort for having edited Sir Arthur Hort's last book, which he had almost completed before his untimely death in March 1935. Like his earlier work, " The Unconventional Garden," it contains a wealth of useful practical information and sound commonsense in garden craft. The book has the great merit of being written by one who was not only a fine classical scholar with a great knowledge of plants both in their native haunts and under cultivation, but who was also a real gardener who knew the delight of taking off his coat and working with his own hands. Sir Arthur is thus able to give the results of his own experience in the handling of plants, coupled with many shrewd and valuable observations on matters of botanical and horticultural interest, which only those who practise the art with the perceiving eye can fully appreciate. The touch of humour throughout the book and the interest added to it from his knowledge of the Classics brings the author vividly before one as one reads. Here and there, those who were privileged to know him well can almost hear his voice in some characteristic remark about a plant or an incident.

The references to the origins of plant names and the allusions to historical associations and country lore, together with pleasing quotations from Gerard's Herbal, Theophrastus and other sources add much to the interest of the book.

Towards the end Sir Arthur gives some interesting particulars about our native plants worthy of cultivation and some sound advice as to how and how not to collect plants for the garden both at home and in the Alps.

* By Sir Arthur Hort. Edward Arnold & Co., London, 1935. Pp. 255. Price 10s. 6d.

The book is in four parts—" The four seasons follow in their course and all things come to life "—Winter, Spring, Summer and Autumn. In each section the author reveals himself as a sage bringing from his treasure house things new and old.

Lady Hort's hope, expressed in her preface, that the book will help to keep Sir Arthur's " memory to his friends as a living force and not a mere recollection " is certainly fully justified and also strengthened by the charming and characteristic photograph of the author in his garden.

A. W. H.

The Lily Year-Book.*—The Lily Year-Book for 1935, published by the Royal Horticultural Society, maintains the standard of its predecessors, and is of value alike to botanists and horticulturists. Of scientific interest are the papers recording experiments on drainage-conditions as affecting lily growth which have been conducted by Dr. M. A. Tincker in the laboratories at Wisley, and on vegetative propagation of lilies by the late Dr. D. Griffiths if the U.S.A. Bulb Station at Bellingham, Washington. The list of lily names and synonyms prepared by Dr. F. Stoker is of special value. This list has been compiled with great care, the author, having recognized the pitfalls of plant naming, has wisely sought the advice of experts, so that the list is accurate, not only taxonomically but also as regards nomenclature. A very readable contribution is the article by T. Hay, who deals with important lily literature from the 16th Century onwards. The remaining articles chiefly concern the different aspects of cultivation, though various other subjects of interest to lily-growers are touched upon.

Third Imperial Botanical Conference.—The Report of the Proceedings of the Third Imperial Botanical Congress held in London, August, 1935, has now been published and may be obtained from the Royal Botanic Gardens, Kew, price 1s. An account of the various communications is given, together with a list of members, and references to the place of publication of much of the work described.

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* Lily Year-Book, No. 4, 1935. Royal Horticultural Society : London, 1935. Pp. 140 ; 30 figs. Price 5s. paper, 6s. cloth.

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